Detailed Project Report
Main Trunk Sewer Line
North Nashua River
Leominster, Massachusetts

EMERGENCY STREAMBANK PROTECTION

July 1992

US Army Corps
of Engineers
New England Division

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This planning study describes the results of economic, engineering, and environmental evaluation for providing streambank erosion control measures along the N. Nashua River to prevent future damage or destruction of a main trunk sewer line. The proposed plan of protection includes placement of stone slope protection along a 400± foot long reach of the river and replacement of 1400 square feet of riparian habitat. The report requests approval for the preparation of plans and specifications.

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Streambank Erosion Control
Main Trunk Sewer Line - Leominster, MA

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EMERGENCY STREAMBANK PROTECTION

NORTH NASHUA RIVER

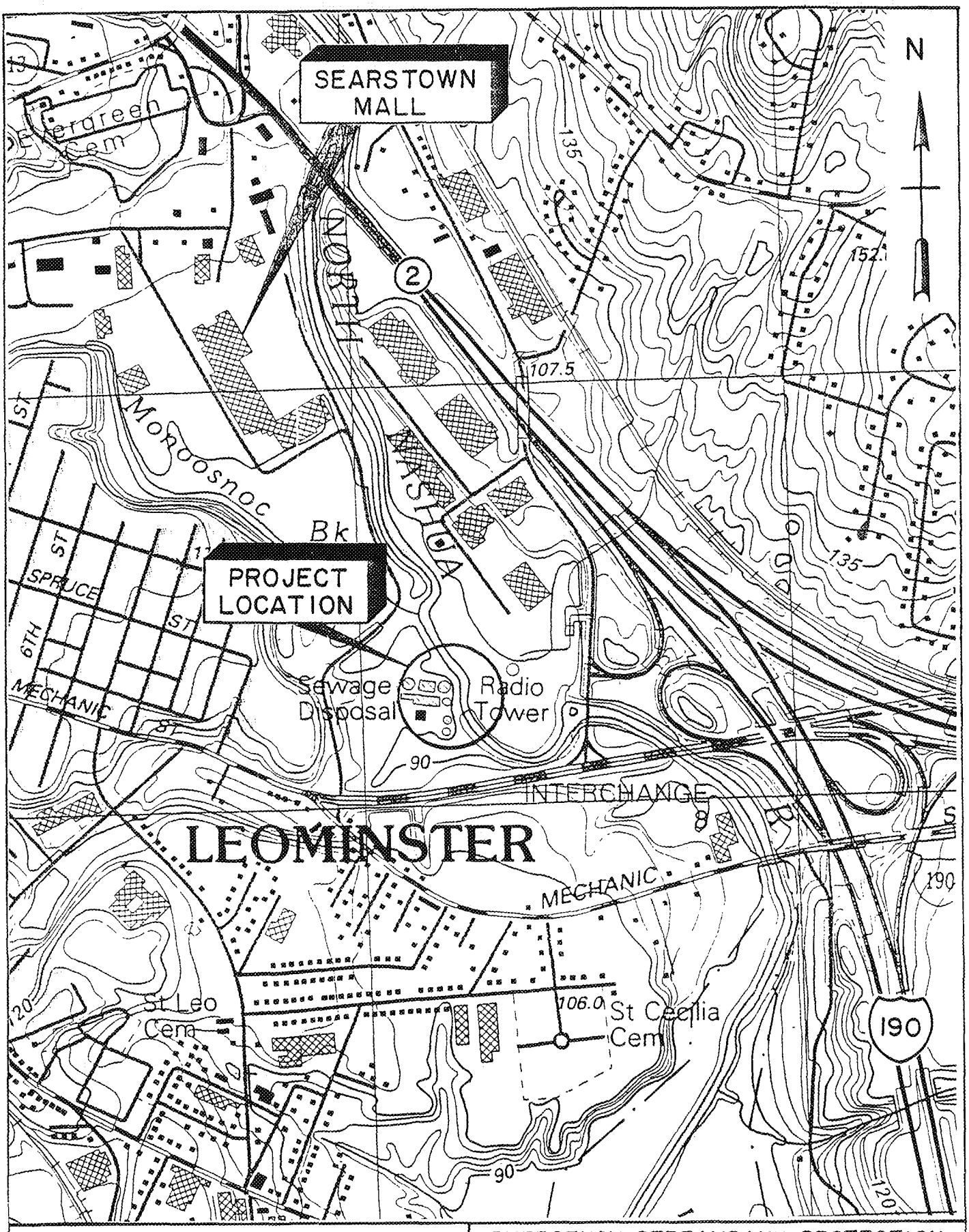
MAIN TRUNK SEWER LINE

LEOMINSTER, MASSACHUSETTS

DETAILED PROJECT REPORT

Department of the Army
New England Division, Corps of Engineers
Waltham, Massachusetts 02254-9149

JULY 1992



VICINITY MAP

EMERGENCY STREAMBANK PROTECTION

MAIN TRUNK SEWER LINE

LEOMINSTER, MA.

SCALE: 1" = 1000'	MARCH 1992	PLATE 2

DETAILED PROJECT REPORT
NORTH NASHUA RIVER
MAIN TRUNK SEWER LINE
LEOMINSTER, MASSACHUSETTS

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DETAILED PROJECT REPORT
NORTH NASHUA RIVER
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EXECUTIVE SUMMARY

This report provides the results of a detailed study, accomplished under the special continuing authority contained in Section 14 of the 1946 Flood Control Act, as amended, to determine the need and feasibility of providing streambank erosion control measures along the North Nashua River near the wastewater treatment facility in Leominster, Massachusetts. The study investigated several alternatives for protecting a 400 foot long section of a 12 foot high embankment adjacent to a main trunk sewer line known as the Searstown Interceptor. The study was initiated at the request of the Leominster City Council.

The City of Leominster is located in the northeastern portion of Worcester County in north-central Massachusetts, approximately 34 miles northwest of Boston, Massachusetts. The erosion site is located at a bend in the North Nashua River along the west riverbank. The drainage area at this location is approximately 97 square miles.

The study has determined that a plan of stone slope protection, consisting of a two foot thick layer of graded stone on two one foot thick layers of stone and gravel bedding, would provide a high degree of protection. The estimated first cost of the plan is $184,000 with an estimated annual cost of $18,500. The estimated first cost includes approximately $3,000 for mitigation of loss of wetland habitat and planting of trees to provide shade for fish habitat. The estimated non-Federal first cost share is currently estimated at $46,000. Total annual benefits associated with the protection of the sewer line are estimated at $97,710. The project is therefore economically justified with a benefit to cost ratio of 5.3 to 1.

It is recommended that, subject to conditions of local cooperation as outlined in this report, the proposed project be constructed.

DETAILED PROJECT REPORT

NORTH NASHUA RIVER
MAIN TRUNK SEWER LINE
LEOMINSTER, MASSACHUSETTS
JULY 1992

1. STUDY AUTHORITY

This report provides the results of investigations, accomplished under the special continuing authority contained in Section 14 of the 1946 Flood Control Act, as amended, to determine the need and feasibility of constructing a streambank erosion control structure along the North Nashua River to protect a main trunk sewer line in Leominster, Massachusetts. The Section 14 authority allows for Corps of Engineers participation in the construction of economically justified streambank and shoreline erosion control projects when essential public works or public use facilities are endangered by erosion. Non-Federal cost sharing by a legally empowered and financially responsible sponsor is a requirement of the Section 14 authority. Federal participation for any single Section 14 project is currently limited to $500,000. Federal assistance for alleviating the erosion problem adjacent to the main trunk sewer line was requested by the Leominster City Council.

2. DESCRIPTION OF STUDY AREA

The City of Leominster is located in the northeastern portion of Worcester County in north-central Massachusetts, approximately 34 miles northwest of the City of Boston. Leominster has a generally hilly terrain with elevations ranging from 300 feet NGVD in the east to 1,100 feet NGVD in the west. The North Nashua River flows southeast through the city (see Plate 1 - Location Map). The river drops approximately 52 feet within the city's corporate limits. The channel bottom slope adjacent to the project site is approximately 7.0 feet/mile with the drainage area at the site of about 97 square miles. The current population of Leominster is estimated at 38,000.

The erosion site is located along the right bank of the river downstream from the Searstown Mall, which is the largest shopping mall in the Fitchburg-Leominster Metropolitan area (see Plate 2 - Vicinity Map). The existing erosion area includes several eroded scarps in a 400 foot length that endanger the adjacent sewer line.

A 36 inch reinforced concrete pipe (RCP) main trunk sewer line is located about 13 feet from the top of the riverbank at the eroded area. The river bank is about 12 feet high in this area. The sewer line is the major interceptor from the Searstown Mall area and normally carries up to one million gallons per day (MGD) to the nearby wastewater treatment plant. However, the sewer line is part of a combined gravity system that can carry up to 10 MGD during periods of intense rainfall. The interceptor was constructed during 1988.

3. EROSION PROBLEM

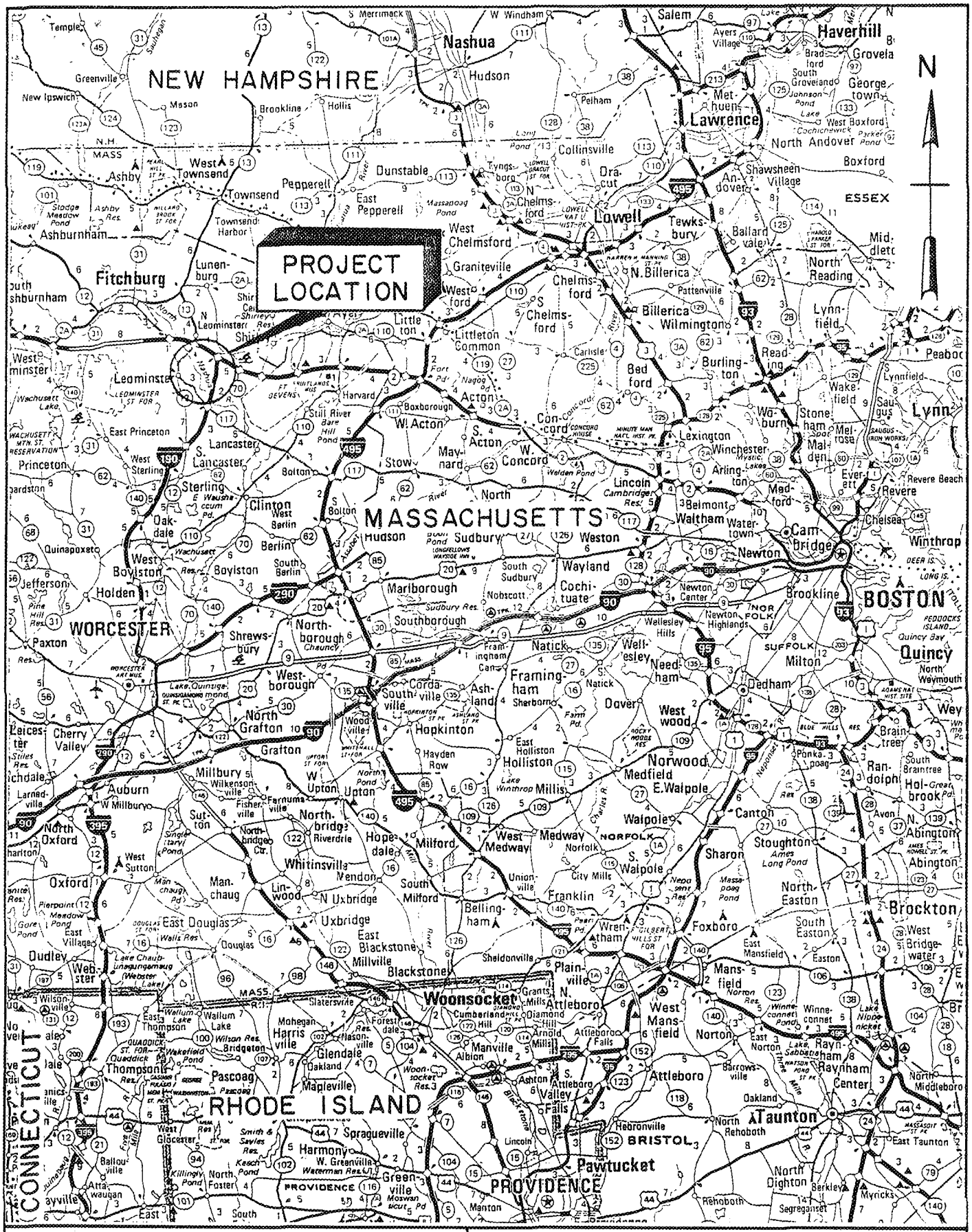
During a period of intense rainfall and runoff in late winter of 1991, the river embankment experienced a severe washout about 75 feet long and 10 feet deep. Subsequent to the flood event the Leominster Department of Public Works dumped random fill and stone into the eroded area. This work is not considered a permanent solution and, in addition, adjacent vegetated riverbank areas are still vulnerable to future erosion. The total embankment, susceptible to future erosion damage is about 400 feet long.

During major floods, a low lying flood plain on the opposite riverbank prevents extremely high velocities in the main channel. Average flow velocities in the channel were estimated to reach 7.3 feet per second (see Appendix A, Technical Engineering). Flow velocities of this degree would cause scour on the right bank.

4. PLAN FORMULATION

Prior to formulating a plan of protection for the endangered sewer pipe, a "without project" condition was evaluated to determine impacts to the area and the community if an erosion control project was not constructed. Without providing any form of permanent erosion protection the embankment would continue to erode and any period of prolonged rainfall and high river flows could cause undermining and damage to the 36 inch sewer main and nearby manholes, thereby creating uncontrolled waste discharge into the North Nashua River. In turn, this pollution could severely impact on fish population and other benthic organisms. In the past this section of the North Nashua River was heavily polluted due to discharges from upstream paper plants, primarily in Fitchburg, MA, that used the river as an open sewer. Several years ago a large wastewater treatment plant was constructed in Fitchburg and since that time the river has been relatively pollution free and fish have returned to the river.

Four methods of embankment protection were initially considered to determine a cost effective plan for protecting 400 linear feet of riverbank. These included: (1) stone slope protection, (2) precast concrete modular wall, (3) precast concrete grid blocks, and (4) gabions. In addition, a plan for relocation of the sewer line was investigated to determine if that would be more viable than protecting the riverbank against erosion.



LOCATION MAP

EMERGENCY STREAMBANK PROTECTION

MAIN TRUNK SEWER LINE

LEOMINSTER, MA.

SCALE: 1" = 7± Miles	MARCH 1992	PLATE 1

The stone slope protection plan would consist of a two foot thick layer of graded stone placed on layers of bedding stone and bedding gravel. Because these materials would be placed on a flatter slope of 2 horizontal to 1 vertical, granular fill materials would be required under the bedding layers.

Precast modular wall construction consists of stacking modular sections along the eroded bank and backfilling with random fill materials. This method of construction provides a nearly vertical face and would therefore have less impact on the riverine setting than a sloped revetment. However, such a plan would be more costly than stone slope protection.

Precast concrete grid blocks would be placed on a 2 horizontal to 1 vertical slope, similar to the stone slope protection configuration after reshaping the bank and adding fill from nearby shoaled areas. The grid blocks would be placed on a filter material and/or gravel bedding. This plan is also more costly than stone slope protection.

Gabions are rock filled wire baskets that are wired together to form a permeable barrier for erosion control. They are stacked, similar to the modular wall previously noted, and compacted backfill materials are placed behind the gabion wall. Construction of gabions is labor intensive and results in higher costs than the stone slope protection plan.

Relocation of the 36 inch RCP away from the riverbank would entail considerable cost because it would have to be placed on the opposite side of the treatment plant as there is insufficient distance between the existing pipe and the treatment plant.

5. SELECTED PLAN

The selected plan of erosion control includes shaping the existing 12 foot high riverbank and filling with granular fill in certain areas to allow for placement of a two foot thick layer of stone slope protection on 1 vertical to 2 horizontal slope. The stone armor layer would be placed on one foot thick layers of stone bedding and gravel bedding. The erosion site is 400 feet long. The general elevation of the top of the bank is between 292 and 293 NGVD. The river bottom elevation is at 281, where an 8 foot wide stone toe would be placed. The river is about 30 to 40 feet wide in this reach.

Although the river reach is generally straight in this area, sediment deposits on the opposite (east) riverbank would be excavated and could be used as granular fill material if suitable. The opposite riverbank is at a considerable lower elevation than the problem area and, during flood periods, acts as an overflow area. Two land projections and the shoaled area on the east bank would be excavated to maintain the 40 foot overall

river width. The east bank excavation would be the minimum amount necessary to avoid channel constrictions in the project area. The excavation would follow the natural contours of the existing bank in as much as possible to maintain natural conditions. Black willow (Salix nigra) and silky dogwood (Cornus amomus) shrubs would be planted along the east bank to provide cover and shade and stabilize the soil.

Approximately 1400 square feet of wetland habitat would be lost within the project area. This area will be compensated through creation of a shallow wetland area along the east bank immediately upstream from the revetment. Further information concerning compensation of wetland habitat is provided in Section E, Actions to Minimize Impacts to Environmental Resources, of the Environmental Assessment.

A plan view and proposed cross sections of the proposed improvements are shown on Plates 3, 4 and 5. Photos of the problem area are shown on Plate 6. A detailed engineering analysis of the selected plan is contained in Appendix A, Technical Engineering. All of the lands and easements required for project construction are owned by the City of Leominster.

6. ESTIMATES OF FIRST COSTS AND ANNUAL CHARGES

Estimates of first costs and annual charge for the selected plan are presented in Table 1. Total first costs are estimated at $184,000. Cost sharing requirements include a 25% non-Federal contribution of the total first cost prior to receipt of construction bids and award of a construction contract. Currently the non-Federal cost share is estimated at $46,000. An annual cost of $500 for maintenance of the project has been included as a non-Federal responsibility. Annual costs are based on the current Federal interest rate of 8 1/2% and amortized over an estimated project life of 25 years. The annual cost is estimated at $18,500.

7. ESTIMATES OF BENEFITS AND BENEFIT COST RATIO

The purpose of this section is to calculate the economic benefits and benefit-cost ratio of preventing erosion along the North Nashua River to protect a main trunk sewer line in Leominster, Massachusetts. All benefits and costs are stated in February, 1992 prices and are converted to present value equivalents based on a 25 year project life and the fiscal year 1992 federal interest rate for water resource projects of 8 1/2 percent.

LEOMINSTER WASTEWATER
TREATMENT FACILITY

N

Existing 2 sludge storage tanks

Existing chain link fence shall be temporarily removed and reinstalled after completion of construction

Existing dumped fill to be removed

Existing 24"ϕ conc. pipe

Existing gate

Abandoned filtering system

Shoal

Sta. 4+30±
End protection

Sta. 4+00

Sta. 3+00

Sta. 2+00

Sta. 1+00

Sta. 0+00
Begin protection

Existing concrete headwall

Existing trees to be removed

Sand bar

Approximately location of East Riverbank

Extend existing 24"ϕ concrete pipe, Length - 20'±

Existing abandoned SS pipe to be plugged

New concrete wingwalls

NORTH NASHUA RIVER

SMH

MH

SS

SD

36"ϕ

27"ϕ

30"ϕ

294 292 298 296 304 302 300 306 288 290 286 284 285

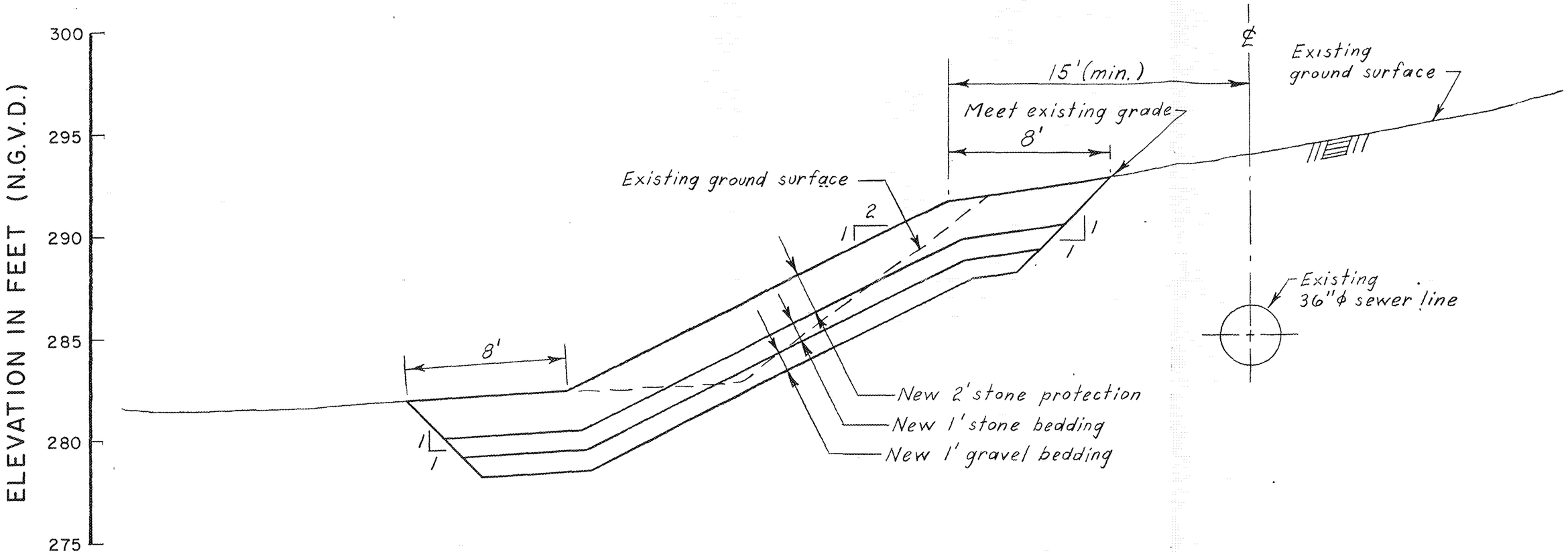
B/5

A/4

PLAN

EMERGENCY STREAMBANK PROTECTION
MAIN TRUNK SEWER LINE
LEOMINSTER, MA.

SCALE: 1" = 40'	MARCH 1992	PLATE 3



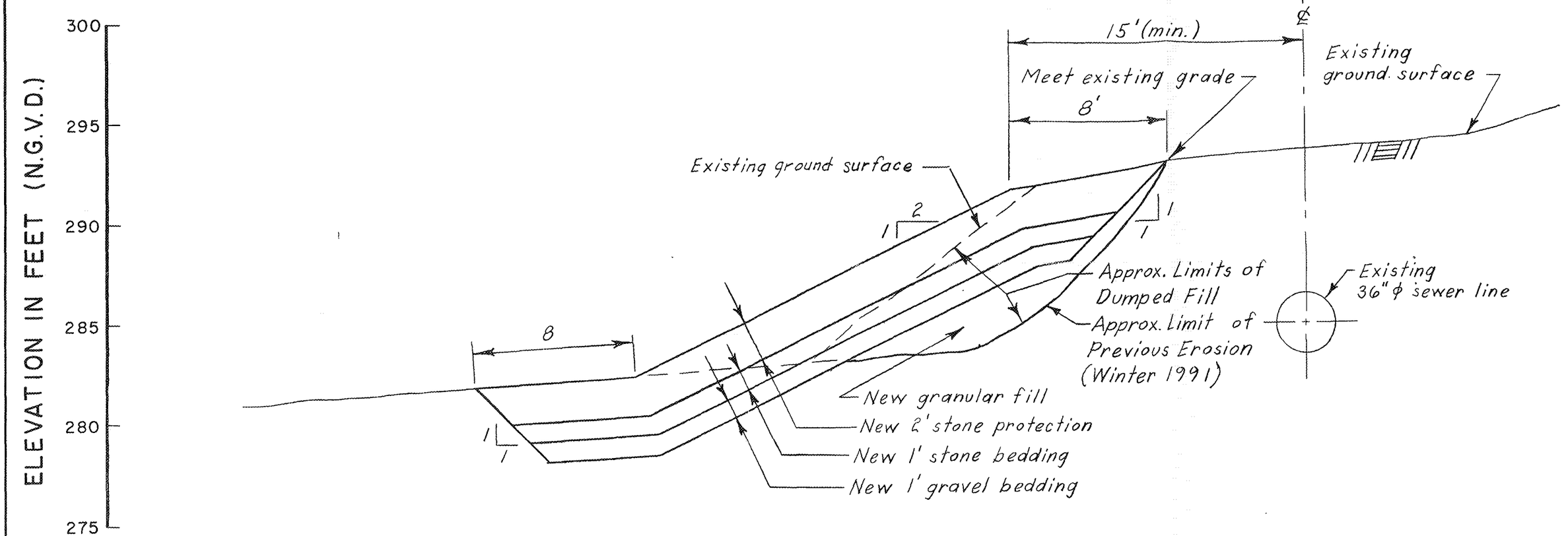
SECTION A/3

EMERGENCY STREAMBANK PROTECTION

MAIN TRUNK SEWER LINE

LEOMINSTER, MA.

SCALE: 1" = 5'	MARCH [illegible]2	PLATE 4



SECTION B/3

EMERGENCY STREAMBANK PROTECTION

MAIN TRUNK SEWER LINE

LEOMINSTER, MA.

SCALE: 1" = 5'	MARCH 1992	PLATE 5

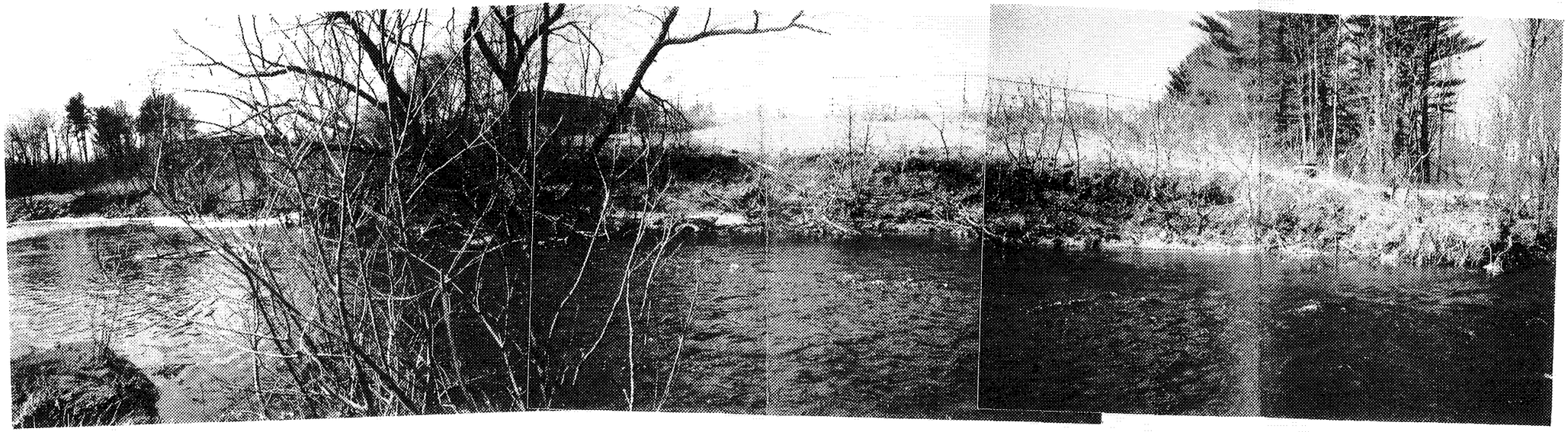


PHOTO 1 (MARCH '92)
UPSTREAM SECTION OF ERODED EMBANKMENT

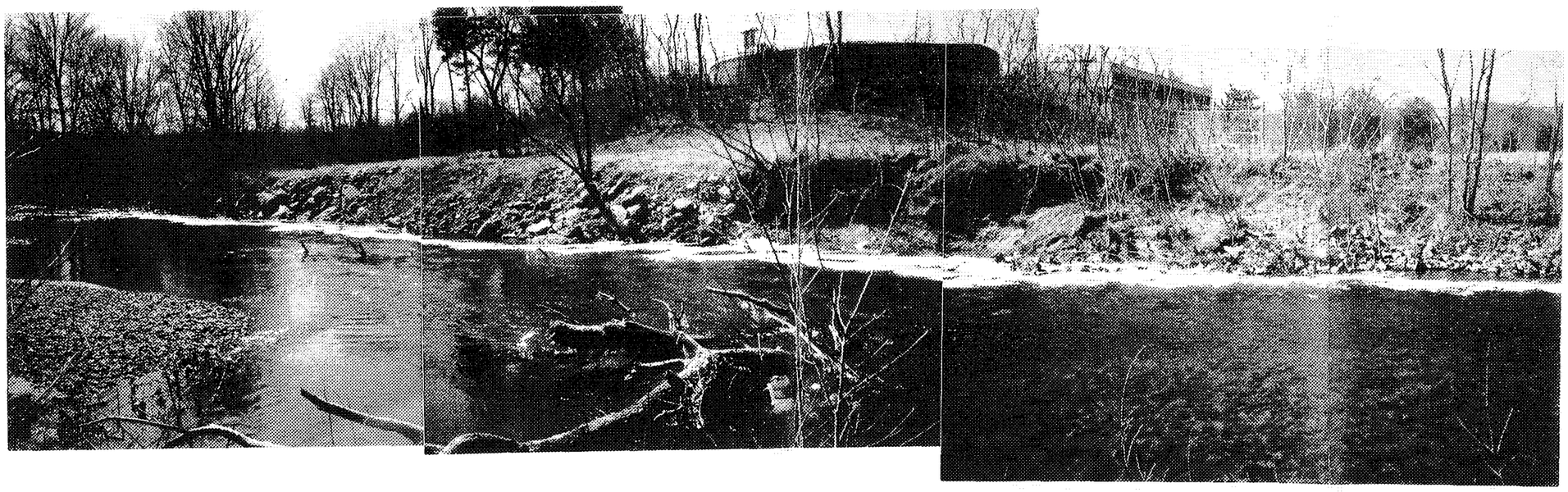


PHOTO 2 (MARCH '92)
DOWNSTREAM SECTION OF ERODED EMBANKMENT & DUMPED FILL

EMERGENCY STREAMBANK PROTECTION
MAIN TRUNK SEWER LINE
LEOMINSTER, MA.

SCALE: NONE	MARCH 1992	PLATE 6

TABLE 1

ESTIMATES OF FIRST COSTS
AND ANNUAL CHARGES
(June 1992 Price Level)

FIRST COSTS

ITEM	QUANTITY	UNIT	UNIT PRICE	COST
MOBILIZATION	1	JOB	L.S.	$ 4,000
CLEARING AND GRUBBING	1	JOB	L.S.	1,000
EXCAVATION, GENERAL	1,500	CY	$ 6.00	9,000
EXCAVATION (SHOALS - EAST BANK)	1,300	CY	7.00	9,100
COMPACTED GRANULAR FILL	100	CY	12.00	1,200
STONE PROTECTION	1,100	CY	35.00	38,500
STONE BEDDING	500	CY	30.00	15,000
GRAVEL BEDDING	500	CY	20.00	10,000
CONCRETE WINGWALL	1	JOB	L.S.	3,000
EXTEND 24" PIPE	1	JOB	L.S.	600
PLUG ABANDONED PIPE	1	JOB	L.S.	300
REMOVE & REINSTALL CHAIN LINK FENCE	1	JOB	L.S.	1,400
TOPSOIL, SEEDED	700	SY	10.00	7,000
PLANTINGS (ENVIRONMENTAL)	1	JOB	L.S.	1,200

SUBTOTAL	$101,300
CONTINGENCY	25,700
TOTAL CONSTRUCTION COST	$127,000
ENGINEERING AND DESIGN	45,000*
SUPERVISION AND ADMINISTRATION	12,000
TOTAL ESTIMATED PROJECT FIRST COST	$184,000

*Does not include pre-authorization costs of $35,000.

ANNUAL COST

INTEREST & AMORTIZATION	$ 18,000
OPERATION & MAINTENANCE	500
TOTAL ANNUAL COST	$ 18,500

Current Corps regulations, contained in Engineering Regulation 1105-2-100, paragraph 6-160, provide guidance for calculating the economic benefits for Section 14 projects. The regulations state that, "Benefits of protection will ordinarily and preferably be the damages prevented by the proposed action, not the increased cost of rebuilding a lost or failed resource." The proposed action is the protection of the sewer pipe by the construction of a stone revetment. The revetment would prevent further erosion of the area and would thus protect the pipe.

The damages prevented by the proposed action equal the costs that would be incurred by the town of Leominster if the erosion is not prevented and the pipe is not protected. Based on the importance of and need for the sewer pipe, and the serious negative environmental and health consequences which would likely occur if the pipe were damaged, the pipe would have to be relocated if it is not protected. The costs of relocating the pipe are thus the damages prevented by the project and are thus also the benefits of the project.

The cost of relocating the sewer pipe is difficult to determine. It would not be possible to simply move the pipe farther away from the river because, next to the pipe, there are two very steep hills on top of which two sludge storage tanks are located. There is essentially no room to move the pipe farther away from the river in that area. Since the pipe could not simply be moved farther in, it would be necessary to relocate the pipe to a completely different area. This would be extremely expensive, since new connections would have to be made to the treatment facility, and since the new pipe would have to be incorporated into the very complex pipe network already existing at the treatment facility. Based on coordination with local officials, the cost of relocating the pipe is estimated at $1,000,000.

The total damages prevented by the proposed project, the stone revetment, equal the estimated cost of relocating the pipe of $1,000,000. Total benefits to the proposed project equal these damages prevented of $1,000,000. Amortized over the 25 year project life using the capital recovery factory at 8 1/2 percent of 0.09771, the annual benefits to the proposed project equal $97,710 ($1,000,000 x 0.09771 = $97,710).

Based on the estimated annual project cost of $18,500, and with annual benefits of $97,710, the proposed project has a benefit to cost ratio of 5.3 to 1 and has net annual benefits of $79,210.

8. ENVIRONMENTAL CONSIDERATIONS

The proposed project is located in a forested riparian floodplain. With the exception of the exposed soils along the eroding riverbank, the North Nashua River floodplain corridor supports a variety of vegetation types which provide nesting, escape, and breeding habitat to fish and wildlife. This section of the river is also growing in popularity for recreational canoeing and fishing.

Construction of the revetment will require shaping and filling a 400 foot section of the North Nashua River riverbank, excavation of the sediment and gravel deposits in the riverbed, excavation of a portion of the opposite floodplain and reconstruction of the Leominster WTF outlet pipe. There will be a permanent loss of existing riparian and bank vegetation and riffle and pool areas within the 400 foot reach. In addition, water quality impacts such as increased turbidity will occur during construction.

The irregular eroding natural bank will be replaced with a homogenous uniform graded slope. The recolonization of aquatic invertebrate species should occur rapidly. Effects of increased turbidity will be reduced with the placement of appropriate siltation devices prior to the commencement of any construction activities and limiting construction activities to times of a low flow during the late summer or fall months. Fish are generally tolerant of short term exposure to moderate levels of suspended sediments. Therefore, no significant long-term effects to finfish populations are anticipated as a result of the proposed project.

Herbaceous vegetation, shrubs and trees along the eroding riverbank will be replaced by the revetment. The upper portion of the revetment will be revegetated after construction which will aid in restoring some vegetation. Excavation will occur along the east bank, the minimum amount necessary to avoid channel constrictions in the project area. The excavation will follow the natural contours of the existing bank in as much as possible to maintain natural conditions and shrubs will be planted along the east bank to provide cover and shade and stabilize the soil. No signicant impacts are anticipated to wildlife as a result of the proposed project.

Approximately 1400 square feet of wetland habitat will be lost within the project area. This area will be compensated through creation of a shallow wetland area along the east bank immediately upstream from the revetment.

The benefits derived by the construction of the revetment include preventing the possible rupture of a main trunk sewer line, thereby preventing the discharge of raw sewage into the North Nashua River. For more detailed information concerning the environmental impacts of the proposed project, an Environmental Assessment, Finding of No Significant Impact and 404(b) (1) Evaluation are included in this report. In addition, a 30 day public review period was completed with no signicant objections to the proposed project.

9. REQUIREMENTS OF LOCAL COOPERATION

During preparation of this report close coordination was maintained with City of Leominster officials and representatives of the Massachusetts Department of Environmental Management (MA DEM). The MA DEM will be the non-Federal sponsor for the proposed local erosion control project. MA DEM will sign a Local Cooperation Agreement (LCA) prior to advertising for a construction contract. Water Quality Certification from the Massachusetts Department of Environmental Protection (MA DEP) will be obtained during preparation of plans and specifications. Letters of intent from the City of Leominster and MA DEM to provide local cooperation agreements are provided in Appendix B.

The draft Local Cooperation Agreement indicates that the local sponsor will:

a. Provide without cost to the United States, all lands, easements, rights-of-way, and utility relocations necessary for project construction.

b. Hold and save the United States free from damages due to the construction, operation and maintenance of the project, except where such damages are due to the fault or negligence of the United States or its contractors.

c. Maintain and operate the project after completion without cost to the United States in accordance with regulations prescribed by the Secretary of the Army. Annual maintenance costs are currently estimated to be $500.

d. Prevent future encroachment which might interfere with proper functioning of the project.

e. Comply with Title VI of the Civil Rights Act of 1964 (78th Stat. 241) and Department of Defense directive 5500.11 issued pursuant to and published in Part 300 of Title 32, Code of Federal Regulations.

f. Assume responsibility for all costs in excess of the Federal cost limitation of $500,000.

g. Provide 25 percent of the total project costs (excluding pre-authorization study costs), including necessary project lands, easements and rights-of-way. The total non-Federal contribution is currently estimated at $46,000.

10. RECOMMENDATIONS

I recommend that this report be approved as a basis for the preparation of plans and specifications and construction of the selected plan described herein under authority contained in Section 14 of the 1946 Flood Control Act, as amended. I further request that the New England Division Engineer be designated the approval authority for the construction plans and specifications.

Recommendations contained herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted for authorization and/or implementation funding. However, prior to transmittal, the sponsor, the state, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

Date 28 JULY 92

Brink P. Miller
Colonel, Corps of Engineers
Division Engineer

ENVIRONMENTAL ASSESSMENT

FINDING OF NO SIGNIFICANT IMPACT

and

SECTION 404 (b)(1) EVALUATION

Section 14

Emergency Streambank Protection

LEOMINSTER, MASSACHUSETTS

prepared by:

Judith L. Johnson
Biologist

July 1992

New England Division
U.S. Army Corps of Engineers
Waltham, Massachusetts 02254-9149

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I. ENVIRONMENTAL ASSESSMENT

A. INTRODUCTION

1. Purpose and Need

This report provides an assessment of the environmental affects of an emergency streambank protection project designed to stabilize a section of riverbank along the North Nashua River, located in Leominster, Massachusetts (see Plate 1, Location Map and Plate 2, Vicinity Map). Streambank erosion is threatening a main sewer line to the Leominster Wastewater Treatment Facility (WTF). Without permanent erosion protection, high river flows could rupture the sewer main and cause uncontrolled raw sewage discharge into the North Nashua River.

2. Project Authority

This report was prepared under the special continuing authority contained in Section 14 of the 1946 Flood Control Act (as amended). Section 14 allows the Army Corps of Engineers to participate in the planning and construction of economically justified streambank erosion control projects in situations where public facilities are threatened.

B. PROJECT DESCRIPTION

1. Selected Plan - Stone Revetment

Project plans call for the shaping and filling an existing 12 foot high bank to allow for placement of a 400 foot stone revetment with a 1 foot vertical to 2 foot horizontal slope. It will consist of compacted granular fill overlain with six inches of crushed stone on the upper bank and 12 inches of gravel bedding overlain with 24 inches of stone protection on the lower bank. The toe of the revetment will extend into the river approximately 8 to 10 feet. Some excavation of the opposite bank is necessary in order to avoid channel constriction in the project area. Sediments excavated from shoal deposits in the riverbed may be used as granular fill material in the construction of the revetment if suitable (see Plate 3 - Plan View, Plate 4 - Section A and Plate 5 - Section B).

Access for construction vehicles will be through the Leominster WTF property. Construction is expected to occur during the late summer/fall of 1993 and is expected to last approximately three months.

2. Alternatives

a. Precast Modular Wall

Precast Modular Wall construction consists of stacking modular sections along the eroded bank and backfilling with random fill material. This method of construction provides a nearly vertical face and would therefore have less impact on the aquatic environment than a sloped revetment. However, this plan would be more a more costly alternative.

b. Precast Concrete Grid Blocks

Precast Concrete Grid Blocks would be placed on a 1 foot vertical to 2 foot horizontal slope similar to the stone slope protection. The bank would require some shaping and filling in some areas. The grid blocks would be placed on filter material and/or gravel bedding. This option was rejected as a more costly alternative.

c. Gabion Wall

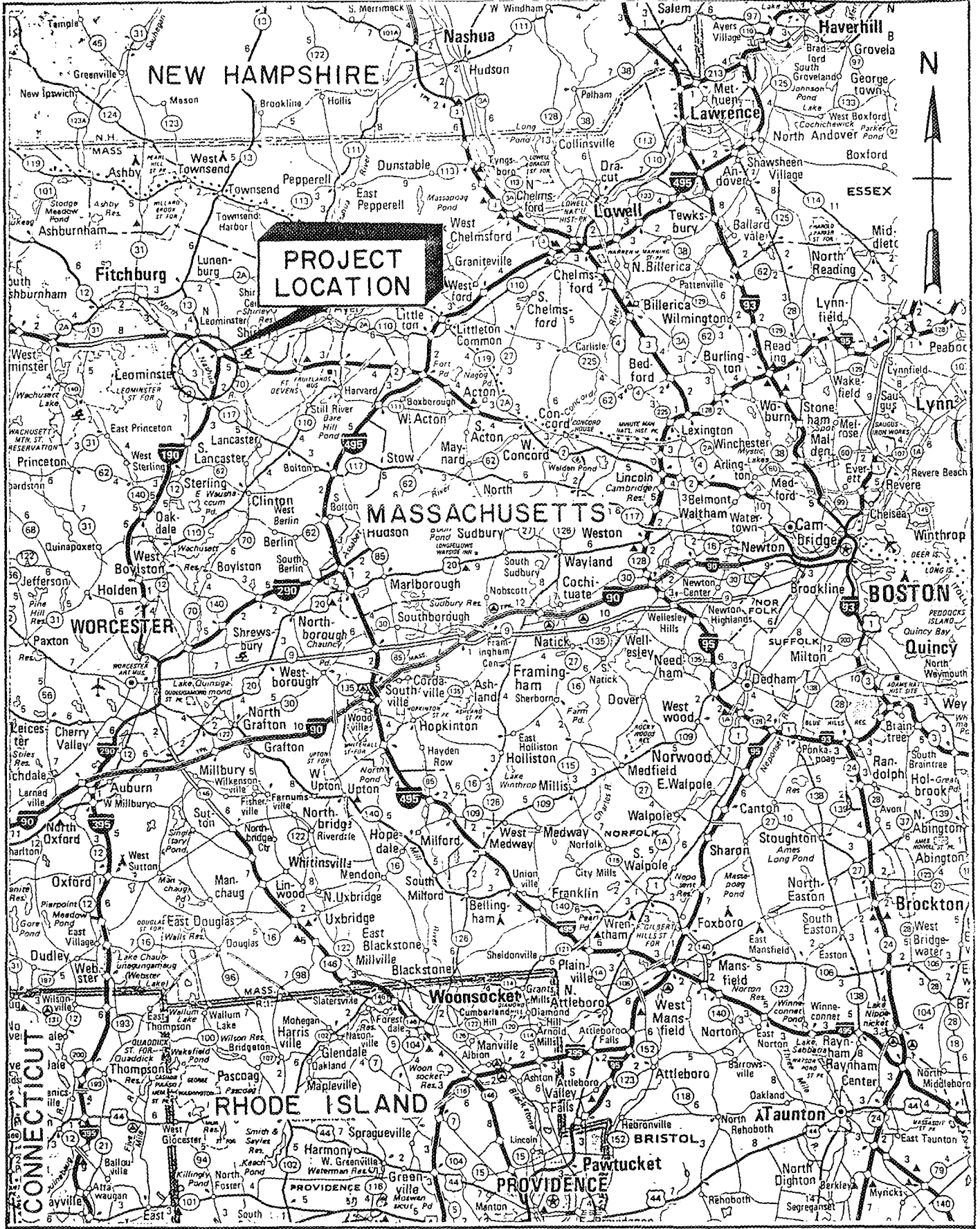
A Gabion (rock filled wire basket) Wall would be stacked similar to the modular wall previously noted and compacted backfill material would be placed behind the wall. Gabion construction would be labor intensive and therefore, this alternative was rejected as a more costly alternative.

d. Relocation of the Sewer Line

Relocation of the 36 inch sewer line away from the riverbank would entail considerable cost because it would have to be placed on the opposite side of the wastewater treatment facility. There would be insufficient distance between the existing pipe and the wastewater treatment facility therefore, this was not considered to be a viable alternative.

e. No Action

If no action is taken to stabilize the eroding riverbank, erosion will continue which may cause the sewer line to rupture and discharge raw sewage into the North Nashua River. This is not an acceptable alternative.



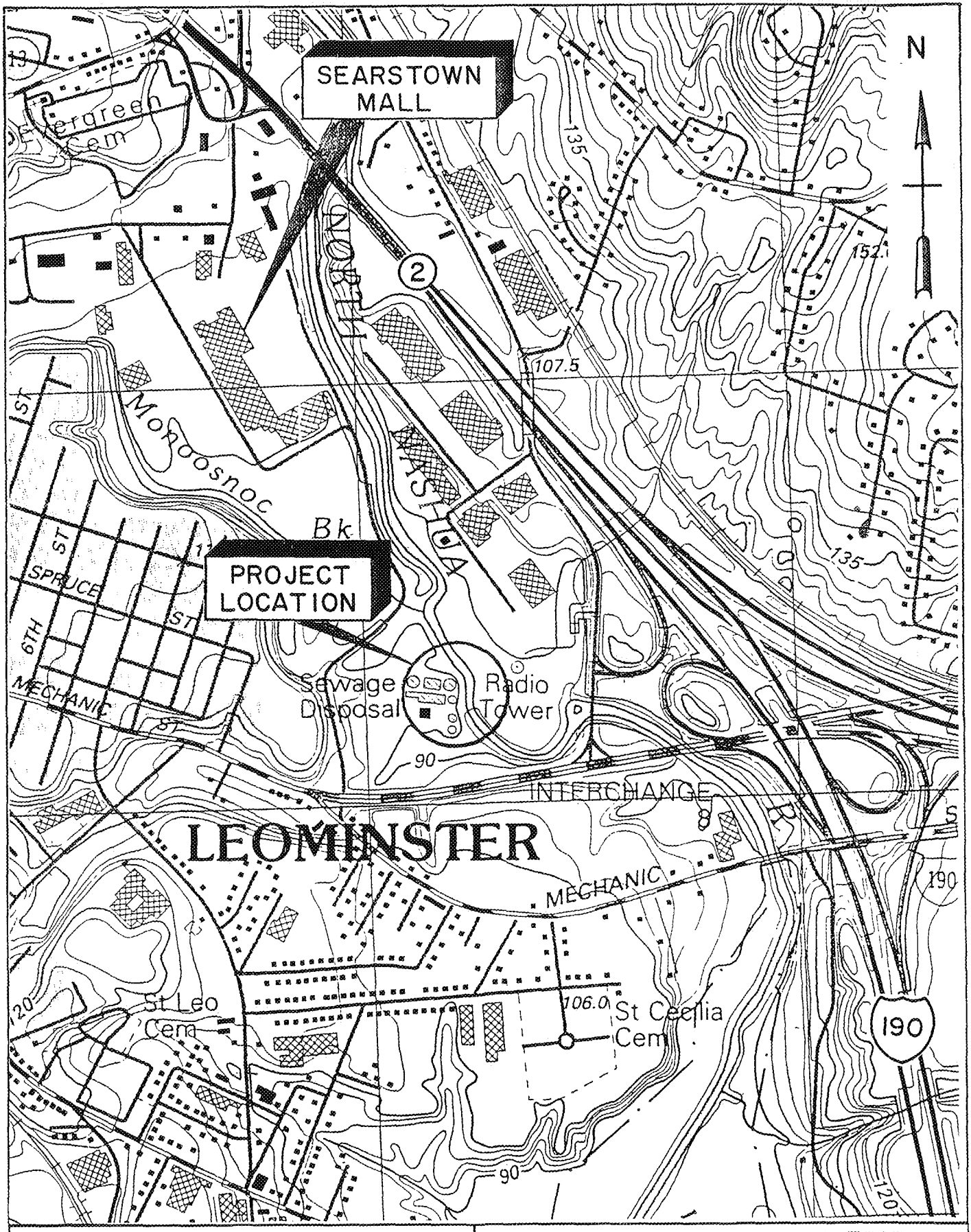
LOCATION MAP

EMERGENCY STREAMBANK PROTECTION

MAIN TRUNK SEWER LINE

LEOMINSTER, MA.

SCALE: 1" = 7± Miles	MARCH 1992	PLATE 1



VICINITY MAP

EMERGENCY STREAMBANK PROTECTION

MAIN TRUNK SEWER LINE

LEOMINSTER, MA.

SCALE: 1" = 1000'	MARCH 1992	PLATE 2

LEOMINSTER WASTEWATER TREATMENT FACILITY

N

Existing 2 sludge storage tanks

Existing chain link fence shall be temporarily removed and reinstalled after completion of construction

Existing dumped fill to be removed

Existing 24"ϕ conc. pipe

Existing gate

Abandoned filtering system

Shoal

Sta. 4+30±
End protection

Sta. 4+00

Sta. 3+00

Sta. 2+00

Sta. 1+00

Sta. 0+00
Begin protection

Existing concrete headwall

Existing trees to be removed

Sand bar

Approximately location of East Riverbank

Extend existing 24"ϕ concrete pipe, Length - 20'±

Existing abandoned SS pipe to be plugged

New concrete wingwalls

NORTH NASHUA RIVER

SMH

MH

SS

SD

36"ϕ

27"ϕ

30"ϕ

B/5

A/4

294 292 290 288 286 284 304 302 300 298 296 285

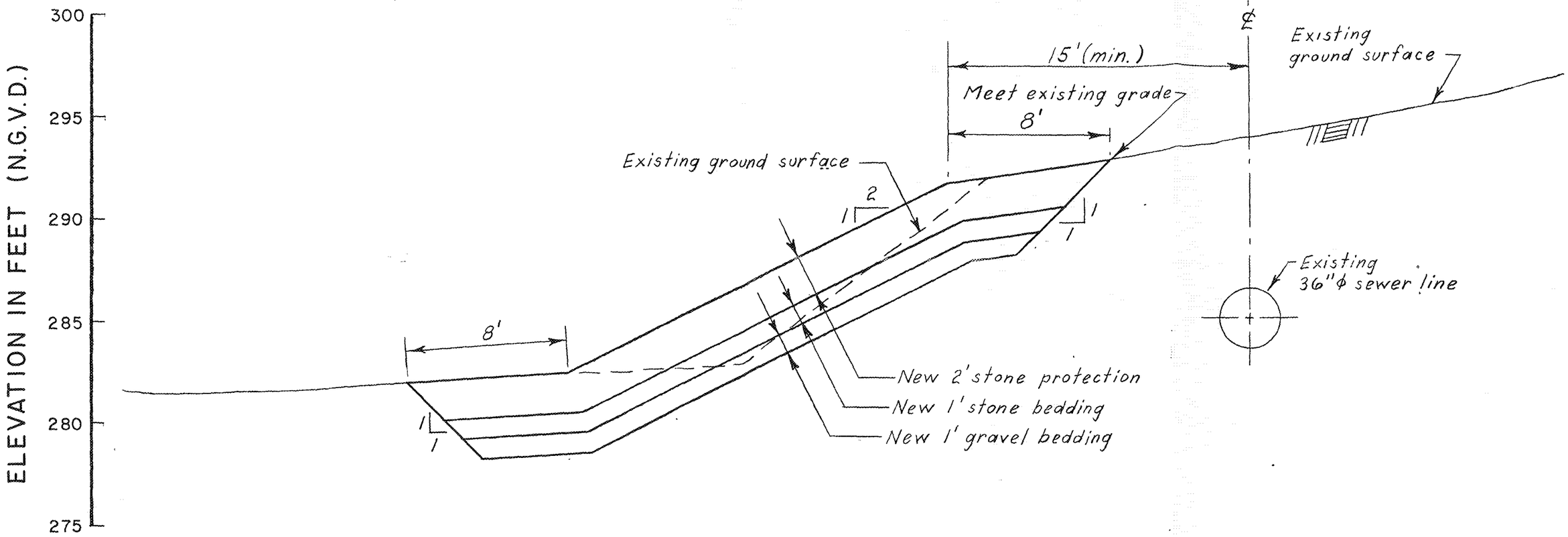
PLAN

EMERGENCY STREAMBANK PROTECTION

MAIN TRUNK SEWER LINE

LEOMINSTER, MA.

SCALE: 1" = 40'	MARCH 1992	PLATE 3



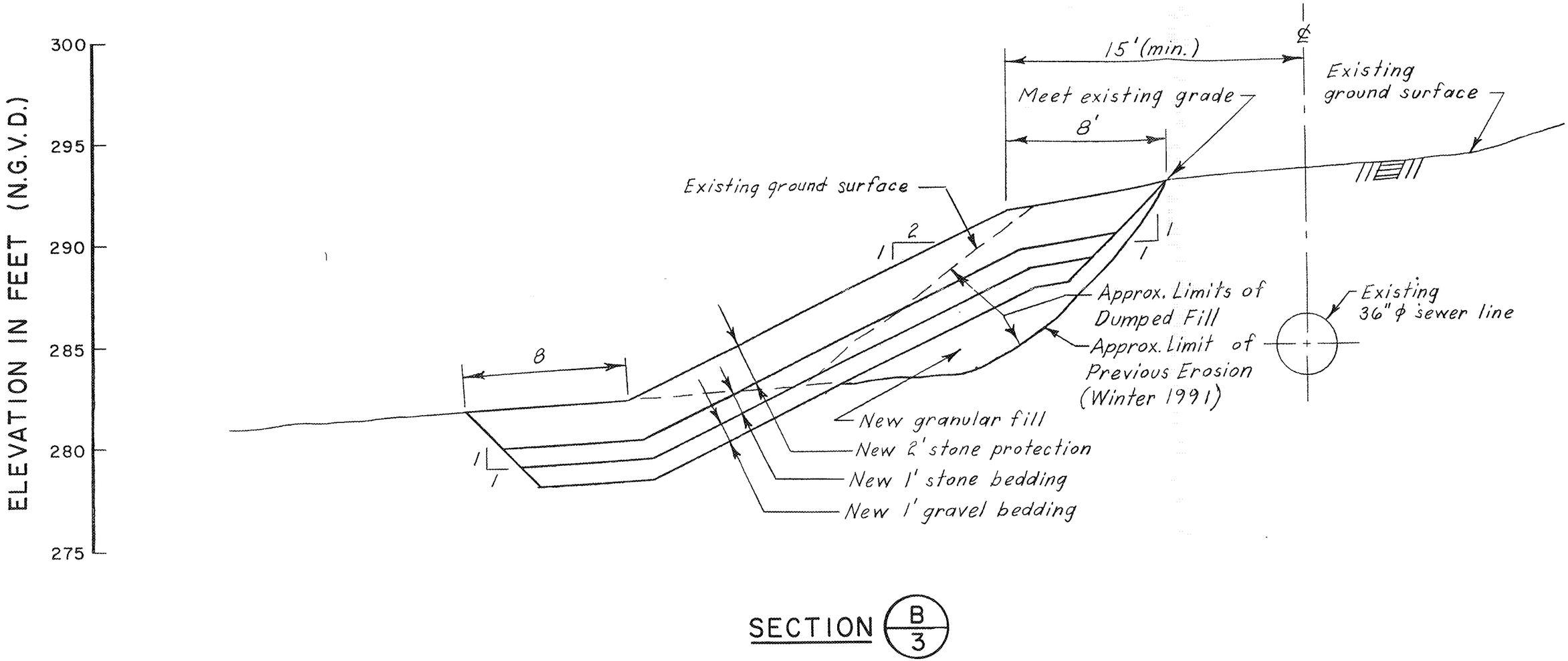
SECTION A/3

EMERGENCY STREAMBANK PROTECTION

MAIN TRUNK SEWER LINE

LEOMINSTER, MA.

SCALE: 1" = 5'	MARCH 1992	PLATE 4



SECTION B/3

EMERGENCY STREAMBANK PROTECTION

MAIN TRUNK SEWER LINE

LEOMINSTER, MA.

SCALE: 1" = 5'	MARCH 1992	PLATE 5

C. AFFECTED ENVIRONMENT

1. Introduction

The City of Leominster is located in the northeastern portion of Worcester County in north-central Massachusetts, approximately 34 miles northwest of the City of Boston. Leominster has a generally hilly terrain with elevations ranging from 300 feet National Geodetic Vertical Datum (NGVD) in the east to 1,100 NGVD in the west. Leominster has a population of approximately 38,000.

The North Nashua River flows southeast through the city dropping approximately 52 feet within the city's corporate limits. The channel bottom slope adjacent to the project site is approximately 7.0 feet per mile with a drainage area equal to 97 square miles. The erosion site, located behind the Leominster WTF, is approximately 400 feet long. During the winter of 1990-1991, a 75 foot long section of this embankment was severely eroded which the City of Leominster has attempted to stabilize with dumped stone.

The Leominster WTF is operated by Environtech Operating Services, Inc. (EOS). In 1991, EOS processed approximately 3.3 million gallons of septage and industrial waste for the City of Leominster. The project area is downstream from the Searstown Mall, which is the largest shopping mall in the Fitchburg-Leominster Metropolitan area. The threatened sewer line, the Searstown Connector, normally carries up to one million gallons per day to the Leominster WTF.

2. Water Quality

Presently, the North Nashua River has been classified as a Class B waterway and as such is designated for uses of protection and propagation of fish, other aquatic life and wildlife; and for primary (i.e. swimming) and secondary contact recreation (i.e. boating).

Data supplied from a 1989 water quality report (WPC, 1989) of the Nashua River Basin indicates dissolved oxygen levels to be 8.6 mg/l during July and 9.9 mg/l during September. Temperature ranges during sampling ranged from 69 degrees Fahrenheit (F) in July to 59 degrees F in September.

Adjacent to the proposed project area is the Leominster Wastewater Treatment Facility. The facility uses Advanced Wastewater Treatment to remove ammonia, nitrogen, and phosphorus during the summer months. Releases of treated effluent into the North Nashua River occur within the proposed project area. The

facility met 99% of National Pollution Discharge Elimination System (NPDES) discharge requirements for 1991, providing a high degree of treatment for the protection of aquatic life in the North Nashua River.

3. Aquatic Habitat

The North Nashua River flows through a forested riparian floodplain. Previous floods and high water have scoured the area of vegetation and deposited tons of urban litter. Litter which has accumulated on the floodplain opposite the project area visually detracts from scenic quality of the river corridor. Approximately 120 tons of debris have been cleaned out of the Monoosnoc Brook (a contributing tributary just upstream of the project area) by a local organization over the last four years (Himlan, 1992).

The channel substrate in the project area consists of small rocks, gravel, and sand (visual observation). Samples taken by the Army Corps of Engineers personnel 15 June 1989 for a similar project downstream indicated populations of Chronomids, Oligochaeta, and Diptera, within the aquatic substrate (ACOE, 1989). These are common invertebrates of freshwater streams and ponds.

A stream survey by the Massachusetts Division of Fisheries and Wildlife (1974-1975) determined that white suckers (Catostomus commersoni) and largemouth bass (Micropterus salmoides) are present in the project area. The Massachusetts Department of Fisheries and Wildlife confirmed that no follow up surveys have been accomplished in the Nashua River since 1975 (telephone conversation 26 May 1992 with Mr. Richard Keller, Environmental Reviewer). It is anticipated that the fish populations may have increased due to an improvement in the water quality of the river . Other fish species likely to be found in this water fishery include bass (Micropterus sp.), pickerel (Esox sp.), fallfish (Semotilus corporalis), suckers (Family Catastomidae), and bullhead (Ictalarus sp.). The channel substrate is an excellent spawning ground for fish species as well as riffle and pool areas which support fish populations.

4. Riparian Habitat

The project is located in a forested riparian floodplain. With the exception of the exposed soils along the eroding riverbank, the North Nashua River floodplain corridor supports a variety of vegetation types which provide nesting, escape, and breeding cover to fish and wildlife. Grasses, shrubs, and small to medium sized saplings and pole-sized tree

species constitute a medium to dense riparian habitat. Dominant taxa include sycamore (Platanus occidentalis), birch, (Betula sp.), red maple (Acer rubrum), willow (Salix sp.), boxelder (Acer negundo), staghorn sumac (Rhus typhina), reed canary grass (Phalaris arundinacea), and smartweeds (Polygonum sp.).

The riparian corridor provides habitat for a variety of wildlife including songbirds, small mammals, reptiles and amphibians, and white-tailed deer (Odocoileus virginianus). Some wildlife species observed during the site visits of 21 April 1992 include mourning doves (Zenaidura macroura), American goldfinch (Spinus tristus), and American robin (Turdus migratorius), mallard (Anas platyrhynchos), great blue heron (Ardea herodias), belted kingfisher (Ceryle alsyon), grey squirrel (Sciurus carolinensis), and eastern cottontail rabbits (Silvilagus floridanus). Additionally, red-tailed hawks (Buteo jamaicenis) have nested in the project vicinity, and there have been sightings of beaver (Castor canadensis) and river otters (Lutra canadensis) within the area (telephone conversation with Ed Himlan of the Nashua River Watershed Association 27 April 1992). It can be expected waterfowl and a variety of small mammals regularly use the area.

A coordinated site inspection was conducted on April 21, 1992 with Federal, State and local agencies with interest or jurisdiction in the proposed project. Participants at this meeting were generally in agreement that the portion of streambank to be directly impacted by the proposed project is steep and narrow and therefore, provides minimal wildlife habitat. However, riparian vegetation along this reach may help maintain lower water temperatures through shading. Increases in water temperature can be detrimental to some species of fish and invertebrates.

Army Corps of Engineers Environmental Regulation (ER) 1105-2-100, December 1990 Section 7-34, c.(12) requires that damage to wetland resources be avoided or minimized to the extent practicable and that unavoidable adverse impacts to wetlands be compensated. Furthermore, ER 1105-2-100, December 1990, Section 7-44, c. requires environmental documentation to describe specific consideration given to protect, preserve, conserve, mitigate adverse impact and enhance wetland resources associated with the recommended plan. This information shall be in sufficient detail to quantify to what extent the recommended plan will contribute to the National goal of no net loss of wetland resources.

The majority of riverbank is steep which supports a variety of characteristically upland trees and shrubs. However, there are two wetland areas, totaling 1400 square feet, adjacent to the river which will be unavoidably impacted by the proposed revetment. One area, 900 square feet, supports a large willow (Salix sp.) and the other area, 500 square feet, supports a grove of European Buckthorn (Rhamnus frangula). Loss of these areas will be compensated through creation of a 1400 square foot shallow wetland area adjacent to the project area and within the same hydrological regime. See Section E. Actions to Minimize Impacts to Environmental Resources for a more detailed discussion.

5. Threatened or Endangered Species

In a letter dated 29 April 1992, the U.S. Fish and Wildlife Service indicated no Federally listed or proposed threatened species occur within the project area, with the exception of occasional transient individuals. In a letter dated 15 May 1992, the Massachusetts Natural Heritage and Endangered Species Program also concurred there are no known State rare, endangered, or species of special concern of either animal or plant communities within the project area.

6. Historic and Archaeological Resources

The North Nashua River vicinity has been studied in the past by the Corps of Engineers. A downstream portion of the river was examined in 1989 as part of highway modifications in the area. This area was subject to a limited archaeological survey of which no prehistoric or historic remains were encountered. The present project area has little potential for historic properties. The erosion site and affected sewer line are adjacent to the Leominster WTF. This area has been disturbed by construction of the above facility, and especially by the sewer line. The opposite riverbank of which the excavation of projections and a gravel shoal to compensate for the construction of a stone revetment in the floodway is likewise heavily disturbed by previous activities. Both areas, therefore are unlikely to have any potential for any structure or site of historic, architectural, or archaeological significance.

D. ENVIRONMENTAL IMPACTS

1. Introduction

Construction of the revetment will require shaping and filling a 400 foot section of the North Nashua River riverbank, excavation of the sediment and gravel deposits in the riverbed, excavation of a portion of the opposite floodplain and reconstruction of the Leominster WTF outlet pipe. There will be permanent loss of existing riparian and bank vegetation and riffle and pool areas within the 400 foot reach. In addition, water quality impacts such as increased turbidity will occur during construction.

A temporary staging area for the material removed from the newly excavated channel will be required. The temporary location will be within close proximity of the construction site so it can be easily accessed as fill material for the revetment. This close proximity will minimize impacts of fill material on vegetation within the riparian corridor.

2. Water Quality

Construction activities will result in temporary increases in the suspended solids load and turbidity in the North Nashua River. Effects of increased turbidity will be reduced with the placement of appropriate siltation devices prior to the commencement of any construction activities and limiting construction activities to times of low flow during the late summer or fall months. Turbidity will be localized and temporary and the downstream effects on aquatic habitat and water quality should be minimal.

3. Aquatic Habitat

The existing aquatic invertebrate community will be destroyed or disrupted through excavation or filling activities in addition to water quality impacts. The irregular, eroding natural bank will be replaced with a homogenous uniform graded slope. However, given the potential for recruitment from upstream habitats and the short regeneration time of aquatic invertebrate species, recolonization should occur rapidly (Nunnally and Shields, 1985). The stone used for the revetment will most likely support invertebrate species similar to the already existing rocky substrate.

All pool and riffle areas will be eliminated within the 400 foot project reach. However, the capacity of the channel will remain the same because excavation along bank and in the channel will equal or exceed the amount of fill placement. The impacts of increased suspended sediment concentration will be minimal given appropriate siltation devices are present. Fish are generally tolerant of short term exposure to moderate levels of suspended sediments (Stern and Stickle, 1978). Once construction is completed, no barriers to hinder river flow will be present. No significant long-term effects to finfish populations are anticipated as a result of the proposed project.

4. Riparian Habitat

Herbaceous vegetation, shrubs and trees along the eroding riverbank will be replaced by the revetment. The upper portion of the revetment will be revegetated after construction which will aid in restoring some vegetation. Excavation will occur along the east bank, the minimum amount necessary to avoid channel constrictions in the project area. The excavation will follow the natural contours of the existing bank in a much as possible to maintain natural conditions. Black willow (Salix nigra) and silky dogwood (Cornus amomus) shrubs will be planted along the east bank to provide cover and shade and stabilize the soil.

Approximately 1400 square feet of wetland habitat will be lost within the project area. This area will be compensated through creation of a shallow wetland area along the east bank immediately upstream from the revetment. Further information concerning compensation of wetland habitat is provided in Section E. Actions to Minimize Impacts to Environmental Resources.

Wildlife and other birds inhabiting the project area will be displaced by construction activities. It would be desirable to conduct construction activities during late summer or early fall to minimize disruption to birds, including waterfowl, and mammals breeding or nesting in the project area.

Construction of the revetment will most likely result in the long term loss of potential breeding habitat for wildlife species which nest within this 400 foot reach. Revegetation of the revetment after completion of construction will be beneficial for species which utilize herbaceous vegetation and grasses. The project will also most likely decrease habitat value for larger mammals, such as beaver, but provide higher quality habitat for mice, shrews, and raptors.

5. Threatened or Endangered Species

No impacts to Federally listed or proposed threatened species are expected as a result of the proposed project. No impacts to Massachusetts rare, endangered, or species of special concern of either animal or plant communities are expected as a result of the proposed project (FWS, 1992 and NHP, 1992).

6. Historic and Archaeological Resources

The proposed stone revetment to be constructed at the erosion site is unlikely to have any effect on historic or archaeological remains. The project area has been heavily disturbed by previous construction, particularly by the Leominster WTF and its adjacent sewer line. Excavation work on the opposite riverbank is likewise unlikely to have any effect on historic properties, due to its disturbed nature. No prehistoric, historic or archaeological resources are known for the proposed project area. Therefore, the proposed activities should have no effect upon historic properties as defined by the National Historic Preservation Act of 1966, as amended. The Massachusetts State Historic Preservation Officer, in a letter dated May 21, 1992, has concurred with these determinations.

E. ACTIONS TO MINIMIZE ENVIRONMENTAL IMPACTS

1. Timing of Construction

Work will occur during the seasonal low flow period. This time frame would minimize any adverse affects on water quality, eggs and larvae of anadromous and resident fish species, and on wildlife which inhabit the riparian corridor and reduce erosion potential.

2. Habitat Enhancement/Preservation

The stone revetment will provide suitable habitat for aquatic invertebrates and fish. Any submerged logs or snags in the river channel, not in the immediate construction area, should be left in place to provide shelter for fish.

Following construction, all disturbed areas will be seeded and mulched to prevent superficial erosion. The upper bank of the revetment will be backfilled with topsoil, planted with grasses or clover to prevent erosion.

Along the opposite bank, disturbed areas will be minimized. A portion of the floodplain will be excavated to prevent channel constriction in the project area. The excavation will follow the natural contours of the bank in a much as possible to simulate natural conditions and an irregular edge. The edge or ecotone, the transition between one habitat type and another, is a highly productive area for wildlife. A meandering edge provides more opportunities for wildlife species to utilized two habitat types. Shrubs, such as willow (Salix nigra) and silky dogwood (Cornus amomum), will be planted in the disturbed area along the bank to enhance cover, stabilize the bank, provide erosion control and eventually shade which may help to control water temperature. The irregular bank may also provide some backwater effect which may provide resting areas for fish.

3. Compensation for the Unavoidable Loss of Wetlands

In accordance with ER 1105-2-100, December 1990 which requires that unavoidable losses to wetlands be compensated, a 1400 square foot mitigation site will be excavated within close proximity and within the same hydrological regime to the project area (see Plate 6, Mitigation Site).

The mitigation site will be excavated from upland to 1 foot below the seasonal low water level to create a shallow wetland area attractive to aquatic birds and mammals. A variety of fresh water wetland plants will be planted such as sweet flag (Acorus calamus), rice cutgrass (Leersia oryzoides), duck potato (Sagittaria latifolia) and spatterdock (Nuphar luteum). These species are endemic to the northeast and provide valuable habitat to wildlife as well as erosion control. The mitigation area will provide a quiet backwater site for wildlife for feeding and resting.

F. COORDINATION

Project information letters were mailed to the following prior to the preparation of this report.

Daniel Greenbaum, Massachusetts Department of Environmental Protection
Douglas A. Thompson, U.S. Environmental Protection Agency
Wayne MacCallum, Massachusetts Division of Fisheries and Wildlife

Gordon E. Beckett, U.S. Fish and Wildlife Service
Jay Copeland, Massachusetts Natural Heritage Program
Brian Donahoe, Massachusetts Division of Water Pollution Control
Susan Tierney, Massachusetts Executive Office of Environmental Affairs
Ed Himlan, Nashua River Watershed Association

G. REFERENCES

Army Corps of Engineers (ACOE). 1989. Environmental Assessment for the Section 14 Emergency Streambank Protection Project, Leominster Connector, Leominster, Massachusetts.

Himlan, Edward. 1992. Phone coordination with Edward Himlan, President of the Nashua River Watershed Association on April 27,1992.

Massachusetts Division of Water Pollution Control (WPC). 1989. Water Quality Data and Wastewater Discharge Data and Analysis. (Publication # 16, 465-37-25-10-90-C.R.)

Massachusetts Natural Heritage Program (NHP). Correspondence dated 15 May 1992.

Nunnally, N.R., and F.D. Shields. 1985. Incorporation of environmental features in flood control channel projects. U.S. Army Corps of Engineers (WES) Technical Report E-85-3.

Stern, E.M., and W.B. Stickle. 1978. Effects of turbidity and suspended material in aquatic environments (literature review). U.S. COE (WES) TR D-78-21.

U.S. Fish and Wildlife Service (FWS). 1992. Correspondence dated 29 April 1992.

H. COMPLIANCE WITH ENVIRONMENTAL FEDERAL STATUTES AND EXECUTIVE ORDERS

Federal Statutes

1. Preservation of Historic and Archaeological Data Act of 1974, as amended, 16 U.S.C. 469 et seq.

Compliance: Not Applicable

2. Clean Air Act, as amended, 42 U.S.C. 7401 et seq.

Compliance: Public Notice of the availability of this document signifies compliance with this Act.

3. Clean Water Act of 1977 (Federal Water Pollution Control Act Amendments of 1972) 33 U.S.C. 1251 et seq.

Compliance: A Section 404(b)(1) Evaluation and Compliance Review have been incorporated into this report. An application shall be filed for State Water Quality Certification pursuant to Section 401 of the Clean Water Act.

4. Coastal Zone Management Act of 1972, as amended, 16 U.S.C. 1431 et seq.

Compliance: Not Applicable; project is not located within the State designated coastal zone.

5. Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 et seq.

Compliance: Coordination with the U.S. Fish and Wildlife Service (FWS) has yielded no formal consultation requirements pursuant to Section 7 of the Endangered Species Act.

6. Estuarine Areas Act, 16 U.S.C. 1221 et seq.

Compliance: Not applicable; this report is not being submitted to Congress.

7. Federal Water Project Recreation Act, as amended, 16 U.S.C. 4601-12 et seq.

Compliance: Public Notice of the availability of this document to the National Park Service (NPS) and the Office of Statewide Planning relative to the Federal and State comprehensive outdoor recreation plans signifies compliance with this Act.

LEOMINSTER WASTEWATER TREATMENT FACILITY

N

Existing 2 sludge storage tanks

Existing chain link fence shall be temporarily removed and reinstalled after completion of construction

Existing dumped fill to be removed

Existing 24"ϕ conc. pipe

Existing gate

Abandoned filtering system

Shoal

Sta. 4+30±
End protection

Sta. 4+00

Sta. 3+00

Sta. 2+00

Sta. 1+00

Sta. 0+00
Begin protection

Approximately location of East Riverbank

Extend existing 24"ϕ concrete pipe, Length - 20'±

Existing abandoned SS pipe to be plugged

New concrete wingwalls

Existing concrete headwall

Existing trees to be removed

NORTH NASHUA RIVER

MITIGATION SITE
(1400 square feet)

PLAN

EMERGENCY STREAMBANK PROTECTION

MITIGATION SITE

LEOMINSTER, MA.

8: Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661 et seq.

Compliance: Coordination with the FWS, Massachusetts Natural Heritage Program, and Massachusetts Division of Fisheries and Wildlife signifies compliance with the Fish and Wildlife Coordination Act.

9. Land and Water Conservation Fund Act of 1965, as amended, 16 U.S.C. 4601-4 et seq.

Compliance: Public Notice of the availability of this document to the National Park Service (NPS) and the Office of Statewide Planning relative to the Federal and State comprehensive outdoor recreation plans signifies compliance with this Act.

10. Marine Protection, Research, and Sanctuaries Act of 1972, as amended, 33 U.S.C. 1401 et seq.

Compliance: Not Applicable; project does not involve the transportation nor disposal of dredged material in ocean waters pursuant to Sections 102 and 103 of the Act, respectively.

11. National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470 et seq.

Compliance: Coordination with the State Historic Preservation Office determined that no historic or archaeological resources would be affected by the proposed project.

12. National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321 et seq.

Compliance: Preparation of this report signifies partial compliance with NEPA. Full compliance shall be attained at the time the Finding of No Significant Impact is signed.

13. Rivers and Harbors Act of 1899, as amended, 33 U.S.C. 401 et seq.

Compliance: No requirements for Corps' projects or programs authorized by Congress.

14. Watershed Protection and Flood Prevention Act, as amended, 16 U.S.C. 1001 et seq.

Compliance: Not Applicable

15. Wild and Scenic Rivers Act, as amended, 16 U.S.C. 1271 et seq.

Compliance: Not Applicable; project is not located within a designated wild or scenic river area.

Executive Orders

1. Executive Order 11988, Floodplain Management, 24 May 1977 amended by Executive Order 12148, 20 July 1979.

Compliance: Circulation of this report for public review fulfills the requirements of Executive Order 11988, Section 2(a)(2).

2. Executive Order 11990, Protection of Wetlands, 24 May 1977.

Compliance: Circulation of this report for public review fulfills the requirements of Executive Order 11990, Section 2 (b).

3. Executive Order 12114, Environmental Effects Abroad of Major Federal Actions, 4 January 1979.

Compliance: Not Applicable; project is located within the United States.

Executive Memorandum

1. Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing NEPA, 11 August 1980.

Compliance: Not Applicable; project does not involve nor impact agricultural lands.

II. FINDING OF NO SIGNIFICANT IMPACT

The proposed plan involves the construction of approximately 400 feet of stone revetment along the North Nashua River in Leominster, Massachusetts. At present, bank erosion is threatening a main sewer line to the Leominster Wastewater Treatment Facility (WTF).

The project area is located in a forested floodplain. The loss of approximately 1400 square feet of wetland vegetation is unavoidable. This loss will be compensated by creation of a 1400 square foot shallow wetland area within close proximity and within the same hydrological regime as the proposed project. This area will be planted with wetland vegetation endemic to the northeast and should provide valuable wildlife habitat for nesting, feeding and resting mammals, birds and fish. In addition, the revetment will be planted with grass and the opposing riverbank will be planted with shrubs to provide additional habitat and erosion control. No significant adverse impacts to the environment are anticipated. My determination of a Finding of No Significant Impact is based on the Environmental Assessment and the following considerations.

a. Construction will result in a localized, short term increase in suspended solid load in the North Nashua River. Sediment loading would be minimized by employing standard erosion control techniques and by scheduling the construction during the seasonal low flow period.

b. The project will destroy the existing nearshore aquatic habitat and community along approximately 400 feet of riverbank. The stone base of the revetment will, however, provide a suitable substrate for the reestablishment of a productive aquatic invertebrate community.

c. Although localized changes in fish community structure may occur, the project should have no significant long-term adverse impact on adult fish or fish eggs and larvae in the North Nashua River at Leominster.

d. This project will have no impact on any State or Federal rare or endangered species.

e. No archaeological or historical resources will be affected by this project.

Based on my review and evaluation of the environmental effects as presented in the Environmental Assessment, I have determined that the Leominster Section 14 Emergency Streambank

Protection Project is not a major Federal action significantly affecting the quality of the human environment. Therefore I have determined that this project is exempt from requirements to prepare an Environmental Impact Statement.

28 JULY 92
Date

Brink P. Miller
Colonel, Corps of Engineers
Division Engineer

III. SECTION 404(b)(1) EVALUATION

NEW ENGLAND DIVISION
U.S. ARMY CORPS OF ENGINEERS, WALTHAM, MA

PROJECT: LEOMINSTER, MA, EMERGENCY STREAMBANK PROTECTION

Evaluation of Section 404(b)(1) Guidelines

1. Review of Compliance (Section 230.10(a)-(d)).

a. The discharge represents the least environmentally damaging practicable alternative and if in a special aquatic site, the activity associated with the discharge must have direct access or proximity to, or be located in the aquatic ecosystem to fulfill its basic purpose (if no, see section 2 and information gathered for EA alternative); |X| YES |_| NO

b. The activity does not appear to: 1) violate applicable state water quality standards or effluent standards prohibited under Section 307 of the CWA; 2) jeopardize the existence of Federally listed threatened and endangered species or their critical habitat; and 3) violate requirements of any Federally designated marine sanctuary (if no, see section 2b and check responses from resource and water quality certifying agencies); |X| YES |_| NO

c. The activity will not cause or contribute to significant degradation of waters of the U.S. including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values (if no, see section 2); |X| YES |_| NO

d. Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem (if no, see section 5). |X| YES |_| NO

2. Technical Evaluation Factors (Subparts C-F).

	N/A	Not Signif-icant	Signif-icant
a. Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C).			
1) Substrate.		X	
2) Suspended particulates/turbidity.		X	
3) Water.		X	
4) Current patterns and water circulation.		X	
5) Normal water fluctuations.	X		
6) Salinity gradients.	X		
b. Potential Impacts on Biological Characteristics of the Aquatic Ecosystem (Subpart D).			
1) Threatened and endangered species.	X		
2) Fish, crustaceans, mollusks and other aquatic organisms in the food web.		X	
3) Other wildlife.		X	
c. Potential Impacts on Special Aquatic Sites (Subpart E).			
1) Sanctuaries and refuges.	X		
2) Wetlands.		X	
3) Mud flats.	X		
4) Vegetated shallows.	X		
5) Coral reefs.	X		
6) Riffle and pool complexes.		X	
d. Potential Effects on Human Use Characteristics (Subpart F).			
1) Municipal and private water supplies.	X		
2) Recreational and Commercial fisheries.		X	
3) Water-related recreation.		X	
4) Aesthetics.		X	
5) Parks, national and historic monuments, national seashores, wilderness areas, research sites, and similar preserves.	X		

3. Evaluation and Testing (Subpart G).

a. The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material. (Check only those appropriate.)

1)	Physical characteristics	[X]
2)	Hydrography in relation to known or anticipated sources of contaminants	[X]
3)	Results from previous testing of the material or similar material in the vicinity of the project	[ ]
4)	Known, significant sources of persistent pesticides from land runoff or percolation	[ ]
5)	Spill records for petroleum products or designated hazardous substances (Section 311 of CWA)	[ ]
6)	Public records of significant introduction of contaminants from industries, municipalities, or other sources	[ ]
7)	Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man-induced discharge activities	[X]
8)	Other sources (specify)	[ ]

List appropriate references.

See Environmental Assessment

b. An evaluation of the appropriate information in 3a above indicates that there is reason to believe the proposed dredge or fill material is not a carrier of contaminants, or that levels of contaminants are substantively similar at extraction and disposal sites and not likely to require constraints. The material meets the testing exclusion criteria.

[X] YES [ ] NO

4. Disposal Site Delineation (Section 230.11(f)).

a. The following factors, as appropriate, have been considered in evaluating the disposal site.

1)	Depth of water at disposal site	[X]
2)	Current velocity, direction, and variability at disposal site	[X]
3)	Degree of turbulence	[ ]
4)	Water column stratification	[ ]
5)	Discharge vessel speed and direction	[ ]
6)	Rate of discharge	[ ]
7)	Dredged material characteristics (constituents, amount, and type of material, settling velocities)	[ ]
8)	Number of discharges per unit of time	[ ]
9)	Other factors affecting rates and patterns of mixing (specify)	[ ]

List appropriate references.

See Environmental Assessment

b. An evaluation of the appropriate factors in 4a above indicates that the disposal site and/or size of mixing zone are acceptable..... [X] YES [ ] NO

5. Actions To Minimize Adverse Effects (Subpart H).

All appropriate and practicable steps have been taken, through application of recommendation of Section 230.70-230.77 to ensure minimal adverse effects of the proposed discharge..... [X] YES [ ] NO

6. Factual Determination (Section 230.11).

A review of appropriate information as identified in items 2 - 5 above indicates that there is minimal potential for short or long term environmental effects of the proposed discharge as related to:

a. Physical substrate (review sections 2a, 3, 4, and 5 above). YES [X] NO [ ]

b. Water circulation, fluctuation and salinity (review sections 2a, 3, 4, and 5). YES [X] NO [ ]

c. Suspended particulates/turbidity (review sections 2a, 3, 4, and 5). YES [X] NO [ ]

d. Contaminant availability (review sections 2a, 3, and 4). YES [X] NO [ ]

e. Aquatic ecosystem structure, function and organisms(review sections 2b and c, 3, and 5) YES [X] NO [ ]

f. Proposed disposal site (review sections 2, 4, and 5). YES [X] NO [ ]

g. Cumulative effects on the aquatic ecosystem. YES [X] NO [ ]

h. Secondary effects on the aquatic ecosystem. YES [X] NO [ ]

7. Findings of Compliance or non-compliance.

a. The proposed disposal site for discharge of dredged or fill material complies with the Section 404(b)(1) guidelines.....[X]

28 JULY 92
Date

Brink P. Miller
Colonel, Corps of Engineers
Division Engineer

United States Department of the Interior

FISH AND WILDLIFE SERVICE
400 RALPH PILL MARKETPLACE
22 BRIDGE STREET
CONCORD, NEW HAMPSHIRE 03301-4901

TAKE PRIDE IN AMERICA

April 27, 1992

Mr. Joseph Ignazio, Chief
Planning Directorate
U.S. Army Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254

ATTN: Impact Analysis Division

Dear Mr. Ignazio:

This is in response to your April 1, 1992 letter requesting comments on the proposed streambank protection project in the North Nashua River in Leominster, Massachusetts. The following comments are provided in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and are to follow up on comments which were made during the field trip on April 21, 1992.

The plan involves the placement of a stone revetment along approximately 300 linear feet of riverbank. This stone revetment will encroach about 8 to 10 feet upon the stream channel. The purpose of the revetment is to protect a 36 inch sewer main leading to the Leominster Water Pollution Control Plant. In addition to the revetment, Mr. William Swaine, the Project Manager, has proposed to excavate some of the opposite bank to reduce the constriction of water through this section and to restore the width of the river lost to the revetment.

Our inspection of the site indicates that this section of the streambank provides minimal wildlife habitat. The banks are very steep and there is only a small strip of vegetation providing any cover. The opposite bank also provides minimal wildlife habitat. One of the areas suggested for excavation is mainly a gravel deposit with little vegetation or other habitat structures. We have concluded that the impacts to wildlife as a result of the project would be minimal and, therefore, we have no objections to the project. We would, however, like to make several recommendations.

At the time of the site inspection, the exact location of the downstream end of the revetment was unknown. We recommend that the project be limited to the shortest distance possible. The revetment should be terminated near the downstream bend in the sewer line. In addition, excavation of the opposite bank should be limited to only that necessary to restore the width lost to the revetment.

One of the possible impacts of a revetment of this type upon the aquatic ecosystem is an increase in water temperature. The vegetation along the banks provides some amount of shading, which helps to control water temperature. Loss of this vegetation results in a more open stream, increasing the potential for warming. In addition, the rock used in the revetment can act as a solar collector, conducting heat to the river. Changes in water temperature in a stream can make the stream inhospitable to some of the organisms currently found there, resulting in a change in the aquatic community. Therefore, steps should be taken to minimize this possibility by planting trees and shrubs in all disturbed areas along the bank to provide shade and cover. We also recommend that the portion of the revetment that is not subject to flooding be filled with topsoil and revegetated. These plantings will provide a buffer between the river and the adjacent sewage treatment plant and should provide some degree of shading for the water.

This project most likely will not have a significant impact on the fish and wildlife resources of the area. Therefore, we do not have any objections to the project. We would also be happy to coordinate further on the project designs or on mitigation plans. We appreciate the opportunity to comment on this proposal. If you have any questions concerning this letter, please contact Philip Morrison at (603) 225-1411.

Sincerely yours,

Gordon E. Beckett

Gordon E. Beckett
Supervisor
New England Field Offices

CC: RO/FWE Reading File
Virginia Laszewski, EPA
Mass. Dept of Environmental Management
Office of Waterways
P.O. Box 173
Old Common Road
Lancaster, MA 01523
MA DFW

FWE: PMorrison:4-27-91:603-225-1411

United States Department of the Interior

FISH AND WILDLIFE SERVICE
400 RALPH PILL MARKETPLACE
22 BRIDGE STREET
CONCORD, NEW HAMPSHIRE 03301-4901

April 29, 1992

Joseph Ignazio, Director
Planning Directorate
U.S. Army Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254

ATTN: Impact Analysis Division

Dear Mr. Ignazio:

This responds to your letter dated April 1, 1992, for information on the presence of Federally listed and proposed, endangered or threatened species in accordance with a Section 14 study to provide streambank protection along a portion of the North Nashua River in Leominster, Massachusetts.

Based on information currently available to us, no Federally listed or proposed, threatened and endangered species under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area, with the exception of occasional, transient endangered bald eagles (*Haliaeetus leucocephalus*) or peregrine falcons (*Falco peregrinus*).

Preparation of a Biological Assessment or further consultation with us under Section 7 of the Endangered Species Act is not required. Should project plans change, or additional information on listed or proposed species becomes available, this determination may be reconsidered.

This response relates only to endangered species under our jurisdiction. It does not address other legislation or our responsibilities under the Fish and Wildlife Coordination Act.

A list of Federally designated endangered and threatened species in Massachusetts is inclosed for your information. Thank you for your cooperation and please contact Michael Amaral of this office at 603-225-1411 if we can be of further assistance regarding endangered species.

Sincerely yours,

Gordon E. Beckett

Gordon E. Beckett
Supervisor
New England Field Offices

Inclosure

IN MASSACHUSETTS

Common Name	Scientific Name	Status	Distribition
FISHES:			
Sturgeon, shortnose*	Acipenser brevirostrum	E	Merrimack & Conn. Rivers & Atlantic coastal waters
REPTILES:			
Turtle, green*	Chelonia mydas	T	Oceanic straggler in southern New England
Turtle, hawksbill*	Eretmochelys imbricata	E	Oceanic straggler in Southern New England
Turtle, leatherback*	Dermochelys coriacea	E	Oceanic summer resident
Turtle, loggerhead*	Caretta caretta	T	Oceanic summer resident
Turtle, Atlantic ridley*	Lepidochelys kempii	E	Oceanic summer resident
Turtle, Plymouth red-bellied	Chrysemys rubriventris bangsi	E	Plymouth & Dukes Counties
BIRDS:			
Eagle, bald	Haliaeetus leucocephalus	E	Nesting: Worcester, Franklin and Hampshire Counties; entire state-migratory
Falcon, American peregrine	Falco peregrinus anatum	E	Nesting: Boston & Springfield; entire state-migratory
Falcon, Arctic peregrine	Falco peregrinus tundrius	E	Entire state-migratory
Plover, Piping	Charadrius melodus	T	Atlantic coast
Roseate Tern	Sterna dougallii dougallii	E	Atlantic coast
MAMMALS:			
Whale, blue*	Balaenoptera musculus	E	Oceanic
Whale, finback*	Balaenoptera physalus	E	Oceanic
Whale, humpback*	Megaptera novaeangliae	E	Oceanic
Whale, right*	Eubalaena spp. (all species)	E	Oceanic
Whale, sei*	Balaenoptera borealis	E	Oceanic
Whale, sperm*	Physeter catodon	E	Oceanic
MOLLUSKS:			
Mussel, Dwarf wedge	Alasmidonta heterodon	E	Hampshire County probably extirpated
INSECTS:			
Beetle, Puritan tiger	Cicindela puritana	T	Hampshire County (Conn. River Valley)
Beetle, northeastern beach tiger	Cicindela dorsalis dorsalis	T	Dukes County (beaches, Cape Cod south)
PLANTS:			
Small Whorled Pogonia	Isotria medeoloides	E	Hampshire, Essex, Hampden, Worcester, Middlesex Counties
Gerardia, Sandplain	Agalinus acuta	E	Barnstable County
Bulrush, Northeastern	Scirpus ancistrochaetus	E	Franklin County

* Except for sea turtle nesting habitat, principal responsibility for these species is vested with the National Marine Fisheries Service

Rev. 11-14-91

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

Wayne F. MacCallum, *Director*

15 May 1992 NHESP File No. 92-252

Joseph L. Ignazio
Department of the Army
424 Trapelo Road
Waltham, MA 02254-9149

Re: Streambank protection
North Nashua River, Leominster, MA

Dear Mr. Ignazio:

Thank you for contacting the Natural Heritage and Endangered Species Program regarding rare species and ecologically significant natural communities in the vicinity of the proposed streambank protection project as described in your letter of 1 April 1992.

At this time, we are not aware of any rare and endangered species or ecologically significant natural communities within the vicinity of the proposed project.

Please note that this determination is based on the most recent information available in the Natural Heritage database, which is constantly being expanded and updated through ongoing research and inventory. Should new rare species information become available, this determination may be reconsidered. This evaluation does not consider the potential impacts to inland fisheries. To receive such an evaluation contact Richard Keller, Field Headquarters, Division of Fisheries and Wildlife, Route 135, Westborough, MA 01581.

Please contact Jay Copeland, Environmental Reviewer, if you have any questions.

Sincerely,

Patricia Huckery
Assistant Environmental Reviewer

Natural Heritage & Endangered Species Program
100 Cambridge Street, Boston, MA 02202 (617) 727-9194, (617) 727-3151
An Agency of the Department of Fisheries, Wildlife & Environmental Law Enforcement

May 7, 1992

Planning Directorate
Impact Analysis Division

SUBJECT: Environmental Assessment for the North Nashua River Sewer Line, Leominster, MA

Ms. Judith McDonough - Executive Director
Massachusetts Historical Commission
80 Boylston Street
Boston, Massachusetts 02116

Dear Ms. McDonough:

The Army Corps of Engineers, New England Division (NED), is preparing an Environmental Assessment for a proposed emergency streambank protection project designed to stabilize a section of riverbank along the North Nashua River in Leominster, Massachusetts (Plate 1). Streambank erosion is threatening the North Nashua River main trunk sewer line lying along the riverbank and adjacent to the Leominster Wastewater Treatment Plant (See Photographs-Plate 2). We would appreciate your comments on this undertaking.

The erosion site is located along the right bank of the river downstream from the Searstown Mall, which is the largest shopping mall in the Fitchburg-Leominster metropolitan area. During a period of intense rainfall and runoff in the spring of 1990, the problem area embankment experienced a washout about 75 feet long and 10 feet deep. Subsequent to the flood event the Leominster Department of Public Works dumped random fill and stone into the eroded area. This work is not considered a permanent fix and, in addition, adjacent areas are still vulnerable to future erosion.

A 36 inch reinforced concrete main trunk sewer pipe is located about 13 feet from the top of the riverbank at the eroded area. The river bank is about 12 feet high in this area. The sewer line is the major interceptor from the Searstown Mall area and normally carries up to one million gallons per day (MGD) to the nearby waste water treatment plant. However, the sewer line is part of a combined gravity system that can carry up to 10 MGD during periods of intense rainfall. The interceptor was constructed during 1988.

Project plans call for the construction of a stone revetment to stabilize approximately 400 feet of riverbank along the North Nashua

River. The 10 to 12 foot high earth embankment would be protected with a 24 inch layer of stone protection placed on 12 inch stone and gravel bedding layers. The protection would be placed on a graded embankment having a slope of 1 vertical to 2 horizontal. An 8 foot rock toe would be placed at the slope bottom to provide the foundation for the protection works. The proposed protection would extend about 8 to 10 feet into the existing river. As compensation for this encroachment in the floodway, the excavation of two low lying projections and a gravel shoal would be excavated on the opposite riverbank (See Photographs Number 1 and 2). The opposite riverbank is lower than the protected side and acts as an overflow flood plain during high water periods.

Emergency precautions taken by the City of Leominster to prevent failure of the sewer pipe are only of a temporary nature, and future high water conditions could endanger the pipe. Without a permanent revetment plan that prevents scour from high river velocities, the sewer pipe and/or manholes could be undermined and cause discharge of raw sewerage into the river. Because the sewer system is combined with drainage during periods of heavy rainfall, the capacity of this sewer pipe is about 10 million gallons per day (MGD) during these combined flow periods. Therefore, it is evident that a type of permanent protection is required in this area.

The proposed stone revetment to be constructed at the erosion area is unlikely to have any effect upon any structure or site of historic, architectural, or archaeological significance as defined by the National Historic Preservation Act of 1966, as amended. This area of the riverbank has been disturbed by construction of the waste water treatment facility and especially by the construction of the sewer line. Likewise the excavation of projections and a gravel shoal on the opposite riverbank are unlikely to have any effect as well, as this area is heavily disturbed. We would appreciate your concurrence on the above activities.

If you have any questions, please feel free to contact Mr. Marc Paiva of the Impact Analysis Division at (617) 647-8140.

Sincerely,

Joseph L. Ignazio
Director of Planning

Enclosures

CONCURRENCE

JOYCE M. McDONOUGH
STATE HISTORIC
PRESERVATION OFFICER
MASSACHUSETTS
HISTORICAL COMMISSION

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Northeast Region
Habitat and Protected
Resources Division
One Blackburn Drive
Gloucester, MA 01930-2298

June 18, 1992

Mr. James K. Hughes
Lieutenant Colonel
US Army Corps of Engineers
424 Trapelo Road
Waltham, MA 02254-9149

RE: Streambank Erosion Protection on the North Nashua River in Leominister, MA

Dear Mr. Hughes,

We have reviewed the public notice dated May 13, 1992, submitted by the US Army Corps of Engineers, New England Division, to construct an erosion control project along the North Nashua River in Leominster, Massachusetts.

Although we appreciate the opportunity to review this proposed project, it is not expected to impact fishery resources of concern to this agency.

If you have any questions or need additional information, please contact me at 508/281-9312 or Chris Mantzaris at 508/281-9346.

Sincerely,

Kathy Middleton

Kathy Middleton
Environmental Protection
Assistant

JUN 25 1992

solution based on NED experience with similar projects where the cost of various types of wall and revetment sections was estimated.

The stone revetment shown on SK. NO. 3 was designed based on the principals and procedures in "Hydraulic Design of Flood Control Channels" (EM 1110-2-1601), "Soils Mechanics Design Seepage Control" (EM 1110-2-1901), and "Design and Construction of Levees" (EM 1110-2-1913). A D_{30} of 0.8 feet was developed by Water Control Division and was used to design the stone layer thicknesses as shown on SK. NO. 3. A formal slope stabililty analysis was not performed on the proposed section because there is not exploration and laboratory test data available to justify performing an analysis. Based on NED experience with similar materials and stability charts, the proposed 1 vertical on 2 horizontal slope is judged to be safe. It should be noted that the proposed 1 vertical on 2 horizontal slope would be much safer than the existing slopes (visually estimated to be steeper than 1 vertical to 1.5 horizontal). The proposed bedding layers have been designed as filters to prevent migration of fine materials yet allow water to drain into the river. It is recommended that construction of the proposed section be continued to the north and south of the eroded areas until it matches existing slopes of 1 vertical to 2 horizontal. It is estimated that 400 linear feet of the proposed section will be required.

Construction access for construction of the stone revetment does not appear to be a problem. The proposed construction areas can be reached by traveling on relatively flat grassy areas from paved areas at the Leominster Wastewater Treatment Facility. A small amount of gravel might be needed to travel over soft spots in the grassy areas, if they occur. Construction of the stone revetment can be mostly done from the top of slope. Only a small amount of work in the river should be required. Construction materials and labor are readily available near the proposed job site.

PAUL SCHIMELFENYG
Civil Engineer

N. NASHUA SEWER S14
Q50

PROGRAM OUTPUT FOR A NATURAL CHANNEL
INPUT PARAMETERS

SPECIFIC WEIGHT OF STONE (LBS./CU. FT.)	165.0
MINIMUM CENTERLINE BEND RADIUS, FT.	200.0
WATER SURFACE WIDTH, FT.	100.0
FLOW DEPTH, FT.	12.0
CHANNEL SIDE SLOPE, 1 VERT: ? HORZ	2.00
AVERAGE CHANNEL VELOCITY, FT/SEC	7.27
COMPUTED LOCAL DEPTH AVE. VEL., FT/SEC	11.51
LOCAL VELOCITY / AVE. CHANNEL VEL.	1.58
STONE LAYER THICKNESS / D100 MAX	1.00
CORRECTION FOR LAYER THICKNESS	1.00
SIDE SLOPE CORRECTION FACTOR	1.18
CORRECTION FOR SECONDARY CURRENTS	1.22
RIPRAP DESIGN SAFETY FACTOR	1.10

****

COMPUTED D30, FT. = .81
D30 [MINIMUM] FROM GRADATION SHOULD BE
GREATER THAN OR EQUAL TO COMPUTED D30

****

USING GRADATION FROM ETL 1110-2-120

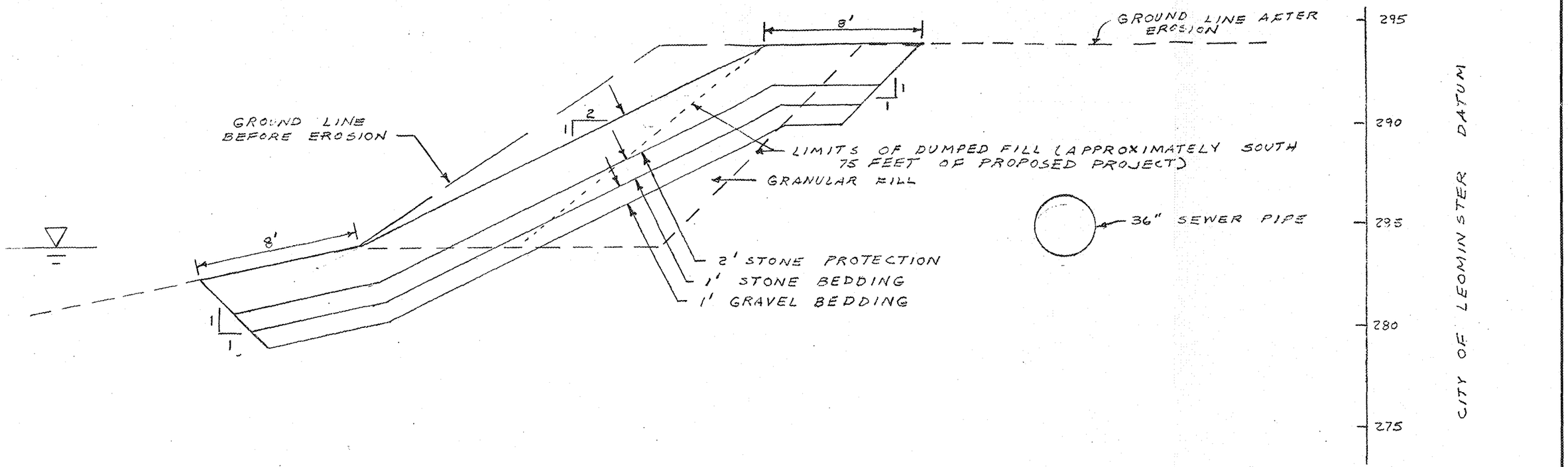
FOR STONE HAVING A SPECIFIC WEIGHT = 165. LBS./CU. FT.
AND PLACED TO A LAYER THICKNESS OF 21. INCHES.

SELECTED MINIMUM D30 = .85 FT.
SELECTED MINIMUM D90 = 1.23 FT.

PERCENT LIGHTER BY WEIGHT	STONE WEIGHT, LBS. MINIMUM	MAXIMUM
W100	185.	463.
W50	93.	137.
W15	29.	69.

NOTES:

1. THE EXISTING SLOPE SHALL BE CLEARED AND GRUBBED PRIOR TO PLACEMENT OF FILL.
2. LEOMINSTER DUMPED FILL TO PROTECT ERODED SLOPE
3. THE STONE PROTECTION THICKNESS WAS DESIGNED FOR A D_{30} OF 0.8 FEET.
4. THE GROUND LINE BEFORE EROSION WAS TAKEN FROM METCALF & EDDY PLANS DATED JANUARY 1989 FOR THE SEWER.



TYPICAL SECTION A

400 LINEAR FEET

Up dated 16 June 1992
Updated 14 May 1992

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY PS	SECTION 14 INVESTIGATION
DR. BY PS	TYPICAL SECTION
CK. BY	LEOMINSTER, MASSACHUSETTS

GEOTECH. ENG. BR. SCALE: 1"=5'
SK. NO. 3 DATE: 6 JAN. 1992

APPENDIX B

LETTERS OF INTENT

Leominster, MA
Emergency Streambank Protection

- Cost Estimate -

Quantities are based upon physical observation of the site conditions and the NED designed revetment. This design calls for excavation, removal and disposal of the existing dump-filled protection and the existing natural banking. The existing river bottom will also have to excavated in preparation of the new revetment toe. All material will be new to the project, unless the river gravel can be used as gravel bedding material.

Construction of the embankment will proceed immediately after the excavation. The working elevation is expected to be slightly below the low (summer) flow. It is also expected that removal of the shoal from the easterly (opposite) bank will create a diversion channel. After shaping the toe, a one (1) foot thick gravel bedding will be placed along the embankment at the design slope. The next two (2) layers of embankment fill consist of one (1) foot stone bedding and a top layer of two (2) foot thick stone protection. The surrounding grassed areas will be returned to the condition which they were found before construction.

The work will require the use of a hydraulic crane, a hydraulic excavator and a front-end loader. The site is accessible through the Town of Leominster Wastewater Treatment Facility. However, the access will require removal and re-installation of the chain-link fence.

A contingency amount was added to allow for miscellaneous items (i.e. sedimentation control, possible temporary earth support system, trunk line protection, traffic control, etc.). The costs of the materials to be used in the work are based upon prevailing prices. The effective price level date is June 1992. Any further erosion prior to construction would require modification of this estimate.

TABLE 1

ESTIMATES OF FIRST COSTS
AND ANNUAL CHARGES
(June 1992 Price Level)

FIRST COSTS

ITEM	QUANTITY	UNIT	UNIT PRICE	COST
MOBILIZATION	1	JOB	L.S.	$ 4,000
CLEARING AND GRUBBING	1	JOB	L.S.	1,000
EXCAVATION, GENERAL	1,500	CY	$ 6.00	9,000
EXCAVATION (SHOALS - EAST BANK)	1,300	CY	7.00	9,100
COMPACTED GRANULAR FILL	100	CY	12.00	1,200
STONE PROTECTION	1,100	CY	35.00	38,500
STONE BEDDING	500	CY	30.00	15,000
GRAVEL BEDDING	500	CY	20.00	10,000
CONCRETE WINGWALL	1	JOB	L.S.	3,000
EXTEND 24" PIPE	1	JOB	L.S.	600
PLUG ABANDONED PIPE	1	JOB	L.S.	300
REMOVE & REINSTALL CHAIN LINK FENCE	1	JOB	L.S.	1,400
TOPSOIL, SEEDED	700	SY	10.00	7,000
PLANTINGS (ENVIRONMENTAL)	1	JOB	L.S.	1,200

SUBTOTAL	$101,300
CONTINGENCY	25,700
TOTAL CONSTRUCTION COST	$127,000
ENGINEERING AND DESIGN	45,000*
SUPERVISION AND ADMINISTRATION	12,000
TOTAL ESTIMATED PROJECT FIRST COST	$184,000

*Does not include pre-authorization costs of $35,000.

ANNUAL COST

INTEREST & AMORTIZATION	$ 18,000
OPERATION & MAINTENANCE	500
TOTAL ANNUAL COST	$ 18,500

PREPARATION OF PLAN AND SECTIONS

General

A plan of the project area, located on the North Nashua River, Leominter, Ma. showing the existing conditions and the proposed protection is shown on Plate 3. Cross sections, taken at two locations along the proposed revetment, are shown on Plates 4 & 5.

Existing Conditions

The existing features shown are based on a site survey, dated January 1988. Survey was original completed for the design of the existing 36" RCP sewer line by Metcalf & Eddy. However during the winter of 1990-1991 the right bank (looking down stream) was eroded by high river flows. The left bank of the river was not included in the original survey. For the purpose of this study, the approximate top of both banks were sketched in to support preliminary design of a revetment.

A topographic survey will be required as part of the final design to accurately show the existing conditions. Both sides of the river will need to be included in the survey as well as selected cross sections of the river.

Layout of Project Features

Alignment of the design section parallel the existing 36" RCP sewer line. The top elevation of the revetment matchs the grade of existing embankment, which varies from from El. 290 (+/-) NGVD at the northern end to El. 292 (+/-) at the southern end. An existing 24" RCP storm drain will be extended through the line of protection. An existing head wall, through which two treated sewer discharge pipes daylight, may need new concrete wing walls.

REAL ESTATE REQUIREMENTS

The project is located on property owned by the City of Leominster, Ma. Therefore, real estate easements will not be required.

Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Management

100 Cambridge Street
Boston
Massachusetts
02202
(617) 727-3180
Fax: 727-9402

Office of the Commissioner

June 2, 1992

Lieutenant Colonel James K. Hughes
U.S. Army Engineers, New England Division
424 Trapelo Road
Waltham, Massachusetts 02245-9149

Re: Federal Streambank Erosion Protection Project
Leominster/North Nashua River Sewer Line

Dear Colonel Hughes:

We are writing to express our intent to enter into an agreement with the City of Leominster to act as Local Sponsor for the above-referenced project to stabilize 400 feet of riverbank along the North Nashua River, where erosion is threatening a main trunk sewer line called the Searstown Interceptor. Enclosed is a copy of a letter received from Mayor John P. Mahan, of Leominster, indicating the city's support of the project.

Our first activity as Local Spomnsor will be to assist the City with their permit process by holding meetings with all Federal, state and local regulatory agencies. Additionally, we will coordinate activities with the Nashua River Watershed Association and other interest groups to make sure their concerns are considered. Upon receipt of all permits we will execute the Local Cooperation Agreement and, depending upon the availability of funds, will contribute to the non-Federal cost of the Project.

It is our understanding that the local cost share for the project is $40,500, or twenty-five percent (25%) of the estimated cost of construction, including preparation of final plans and specifications, of which the city has indicated that it is ready to commit $20,250. When we have received a copy of the Local Cooperation Agreement for the project, we will develop an agreement with the city "mirroring" its terms, and providing for an equal sharing between the city and the Commonwealth for meeting the local cooperation requirement. Since the project is currently scheduled to go to construction in July to August, 1993, which is in the Commonwealth's Fiscal Year 1994, we will tentatively schedule project funding in the amount of $20,250 for that time period.

If there are any questions, please do not hesitate to contact Eugene F. Cavanaugh, Director, Office of Waterways, at (617) 727-3160, Ext. 529, or Leslie Lewis, Rivers and Harbors Program, at Ext. 549.

Very truly yours,

Peter C. Webber
Commissioner

EFC/LRL/lrl

cc: Richard Thibedeau, Acting Deputy Commissioner, DEM/DRC
Eugene F. Cavanaugh, Director of Waterways, DEM/DRC

Office of the Mayor
City of Leominster
25 Main Street
Leominster, MA 01453
(508) 534-7500

John P. Mahan
Mayor

May 18, 1992

Mr. Eugene F. Cavanaugh, Director
Massachusetts DEM Office of Waterways
Saltonstall Building, 14th Floor
Boston, MA 02202

Dear Mr. Cavanaugh:

The City of Leominster has met with Army Corps of Engineers regarding the proposed Streambank Erosion Protection Plan. The work proposed will stop erosion of the North Nashua River bank which is threatening a section of a main trunk sewer line known as the Searstown Interceptor.

The City of Leominster is in full support of this project which calls for the construction of a stone revetment to stabilize approximately 400 feet of riverbank.

Presently, we are hoping that the DEM Office of Waterways will be our legally empowered Non-Federal sponsor to provide the required 25% of the project cost. This amount is currently estimated at $40,500.00

The City of Leominster is willing to commit its share (20,250.00) and make these funds available when the project plans and specifications are completed and prior to construction in July - August, 1993.

Thank you for your support in this project and please call me if you have any questions.

Sincerely,

John P. Mahan
Mayor

JPM/th

Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Protection

William F. Weld
Governor
Daniel S. Greenbaum
Commissioner

July 20, 1992

Joseph Ignazio
Impact Analysis Division
U.S. Corps of Engineers
424 Trapelo Road
Waltham, MA 02254-9149

Re: Initial Comments
bank stabilization
No. Nashua River
Leominster

Dear Mr. Ignazio:

The Division of Water Pollution Control understands the Corps of Engineers is planning to stabilize some 400 feet of eroding bank of the North Nashua River in Leominster, and that a main trunk sewer line is threatened by the erosion. The City of Leominster has dumped rockfill to protect the sewer, but the Corps project would provide a long term solution to the problem.

Once the Corps Headquarters approves this project, plans and specifications will be developed, the local sponsor will seek an Order of Conditions and MEPA approval, and an application will be filed with this Division for Water Quality Certification.

We expect to be able to issue a Certification for the proposed work provided the work will result in only that fill in the river which is needed to protect the bank, and provided there are no adverse and substantive comments from Massachusetts wetlands and fisheries agencies.

Please contact Judith Perry of my staff at 617-292-5655 if you have questions about this matter.

Very truly yours,

Brian Donahoe RRC

Brian Donahoe, Director
Division of Water Pollution Control

cc: Judy Johnson, C.O.E.

BD/JP/yg
30: leominster

APPENDIX A

TECHNICAL ENGINEERING

SECTION 14
HYDROLOGIC AND HYDRAULIC ASSESSMENT
MAIN TRUNK SEWER LINE
NORTH NASHUA RIVER
LEOMINSTER, MASSACHUSETTS

1. GENERAL

The city of Leominster, located in the northeastern portion of Worcester County in north-central Massachusetts, has a generally hilly terrain with elevations ranging from 300 feet NGVD in the east to 1,100 feet NGVD in the west. The North Nashua River flows southeast through the city, and drops approximately 52 feet within the city's corporate limits. The channel bottom slope adjacent to the project site is approximately 7.0 feet per mile with the drainage area at the site equal to approximately 97 square miles.

2. EROSION SITE

Erosion is occurring along the right bank of the North Nashua River downstream from the Searstown Mall and adjacent to a wastewater treatment plant. During a period of heavy rainfall and runoff in the spring of 1991, a 75-foot long and 10 to 15-foot wide section of material eroded from the bank. At that time, the top of bank was within 13 feet of a 36-inch reinforced concrete sewer main which serves the Searstown Mall area. To inhibit further erosion and protect the sewer main, the city of Leominster dumped random fill along the eroded bank. This measure appears to be temporary, at best, and the site is still vulnerable to erosion.

The site is located on the outside of a bend in the river. The bank with the dumped fill is about 10 feet high and slopes at about 1 vertical to 1.5 horizontal. The site then levels off over a distance of 20 feet and again slopes upward at about 1 vertical on 2.5 horizontal. This area is mostly covered with heavy grass. Dense brush covers the bank upstream and downstream of the dumped fill and on the opposite shoreline. The base of the eroded bank is fairly flat for about 15 feet and then slopes gently to the center of the river. A representative from Water Control Division did not visit the site; however, during a site inspection made by Paul Schimelfenyg and John Hart of Geotechnical Engineering Division on 4 September 1991, a sand bar was observed at the base of the left bank (opposite the erosion site).

Erosion at this site is primarily caused by high velocities created during high river flows, and to a lesser degree, local stormwater runoff.

3. HYDROLOGIC CONDITIONS

A USGS gaging station, with a drainage area of 110 square miles, is located about four miles downstream from the site on the North Nashua River near Leominster. The greatest recorded flows on the river at this gage are 16,300, 10,300, and 8,870 cfs which occurred during March 1936, September 1938, and August 1955, respectively. A revised flood insurance study for the city of Leominster, dated April 1989, was used to estimate peak flows at the erosion site. Stages and average velocities were estimated from HEC-2 backwater computations based on rough cross sections at the project site. These cross sections were developed using survey information from a nearby Section 14 project, along with survey plans of the sewage treatment plant area and the applicable U.S. Geological Survey quadrangle map (Ayer, Massachusetts). Estimated peak flow rates and their recurrence intervals, stages, and average channel velocities are presented on the following table:

Recurrence Interval (years)	Estimated Peak Discharge at Site (cfs)	Estimated Stage (feet)	Estimated Average Main Channel Velocity (fps)
10	6,000	10.9	7.0
50	13,000	15.1	7.3
100	18,000	17.7	7.0

Average velocities in the main channel decrease from the 50-year to the 100-year floodflow due to backwater effects and increasing flows in the adjacent flood plains.

4. STREAMBANK PROTECTION

Hydraulic analysis for riprap design is in accordance with EM 1110-2-1601, Hydraulic Design of Flood Control Channels, dated 1 July 1991. Since greater average channel velocities were estimated for the 50-year rather than the 100-year floodflow condition, the riprap design is based on the 50-year depth averaged local velocity. The minimum D_{30} stone size needed to protect the embankment from a flood of this magnitude would be 0.8 foot placed on a 1V:2H slope (see attached Riprap 15 output).

A floodway encroachment analysis was not performed for this feasibility study, but will be if the project enters the design phase when detailed river cross sections become available. It is important to keep the protection out of the river channel to the maximum extent possible to avoid an unacceptable increase in flood levels.

6. Narrative. Several eroded scarps along a 400 foot reach of the North Nashua River west bank in Leominster, MA were inspected by two Leominster DPW and two NED personnel on 4 September 1991 and two NED personnel on 6 January 1992. It appears tht up to 10 feet (top of bank) and 15 feet (bottom of bank) of material was eroded. According to the DPW personnel, most of the erosion occurred during the 1990-1991 winter. The eroded bank was within 13 feet of a 36-inch diameter reinforced concrete sewer at the end of the 1990-1991 winter. The city of Leominster DPW dumped granular fill with cobbles and boulders along the eroded slope as a temporary repair to reduce the rate of erosion. They are concerned that heavy water velocities during future winters and storm events will erode the temporary repair and will endanger the sewer pipe and a nearby sewer manhole.

Typical bank slopes along the eroded reach before the 1990-1991 winter, after the 1990-1991 winter and after the temporary repair are shown on SK. NO. 3. The base of the eroded bank is fairly flat for up to 15 feet, slopes gently downward (approximately 20 feet) to the center of the river and then slopes gently upward (approximately 20 feet) to the opposite bank. The base slopes are typically less than 1 vertical to 5 horizontal. A medium sized sand and gravel bar (approximately 75 feet by 15 feet by 2 feet) was observed at the base of the opposite bank. The top of the eroded bank is a flat area for approximately 20 feet and then slopes upward at approximately 1 vertical to 2.5 horizontal to the west.

The bank materials are stratified fine to medium sands. They are covered by heavy grass at the top of the bank and dense brush on the slope except in the eroded area where the city of Leominster has dumped granular fill. The granular fill consists of fine to medium sand and fine to coarse gravel with rounded cobbles and boulders up to six feet in diameter. The river bottom (bank base) consists of fine to medium sand and fine to coarse gravel with rounded cobbles and boulders up to four feet in diameter. It appears that the fill was excavated from the river bottom and placed on the slope.

The erosion was caused by high water velocities. The sand and gravel bar at the base of the opposite bank helped direct the high water velocities towards the eroded bank. Storm water runoff abetted the erosion caused by high water velocities to a small extent. Once the brush was removed from the bank, the exposed granular materials did not resist the erosive forces well because the individual particles are mostly rounded.

Relocation of the sewer pipe and structural solutions were considered as means to prevent future damage to the sewer pipe. Relocation of the sewer pipe is not feasible. A relocated pipe would have to be placed on the west side of the main treatment plant which is located to the west of the two existing sludge tanks shown on SK. NO. 2. The relocated pipe would cost much more than the structural solutions being considered. A stone revetment was judged to be the most cost effective structural

CENED-ED-GD

Updated 15 May 1992
10 January 1992
Mr. Schimelfenyg/dc/7394

MEMORANDUM FOR Chief, Geotechnical Engineering Division

SUBJECT: Section 14 Investigation at Leominster, MA (Wastewater Treatment Facility Site)

1. Summary. An eroded slope on the west bank of the North Nashua River in Leominster, MA was inspected by New England Division (NED) and city of Leominster Department of Public Works (DPW) personnel. The location of the site is shown on SK. NO. 1. A plan of the site is shown on SK. NO. 2. Up to 15 feet of the bank was eroded during the winter of 1990-1991. The eroded bank was within 13 feet of a sewer pipe at the end of the 1990-1991 winter. The city of Leominster has dumped fill in the river as a measure to slow the erosion but the repair will not last long because adequate filters and tie-ins were not used. A stone revetment, as shown on SK. NO. 3, or relocation of the pipe and manhole to the west are possible methods to reduce the potential of damage to the pipe and nearby manhole from future erosive forces.

2. Purpose. Inspection of streambank erosion at Leominster, MA for possible participation under the Section 14 Authority.

3. Dates of Inspection. 4 September 1991 and 6 January 1992

4. Participants.

John Hart, NED, Engineering Dir., Geotechnical Engineering Div.
Paul Schimelfenyg, NED, Engineering Dir., Geotechnical Engineering Div.
Ray Racine, City of Leominster, Department of Public Works
Lee Robbins, City of Leominster, Department of Public Works

5. Conclusions and Recommendations.

a. Significant erosion has occurred along approximately 400 feet of the North Nashua River in Leominster, Massachusetts.

b. The erosion is caused mainly by high water velocities and to a lesser extent by storm water runoff.

c. The eroded bank was within 13 feet of a sewer pipe after the winter of 1990-1991 at the south 75 feet of the eroded area.

d. The city of Leominster dumped fill along the eroded bank as a temporary measure to reduce the rate of erosion.

e. The temporary measure will not last long because it has not been adequately designed.

f. A practical and economical solution to the erosion problem is to construct 400 linear feet of the stone revetment section as shown on SK. NO. 3.

LEOMINSTER WASTEWATER TREATMENT FACILITY

Existing 2 sludge storage tanks

Existing chain link fence shall be temporarily removed and reinstalled after completion of construction

Existing dumped fill to be removed

Existing 24"ϕ conc. pipe

Existing gate

Abandoned filtering system

EXTREMELY ERODED AREA

Shoal

Sta. 4+30
End protection

Sta. 4+00

Sta. 3+00

Sta. 2+00

Sta. 1+00

Sta. 0+00
Begin protection

Existing concrete headwall

Approximately location of East Riverbank

Extend existing 24"ϕ concrete pipe, Length - 20'±

Existing abandoned SS pipe to be plugged

New concrete wingwalls

Existing trees to be removed

Sand bar

NORTH NASHUA RIVER

SMH

MH

SS

SD

36"ϕ

27"ϕ

30"ϕ

294 292 290 288 286 284 304 302 300 298 296 285

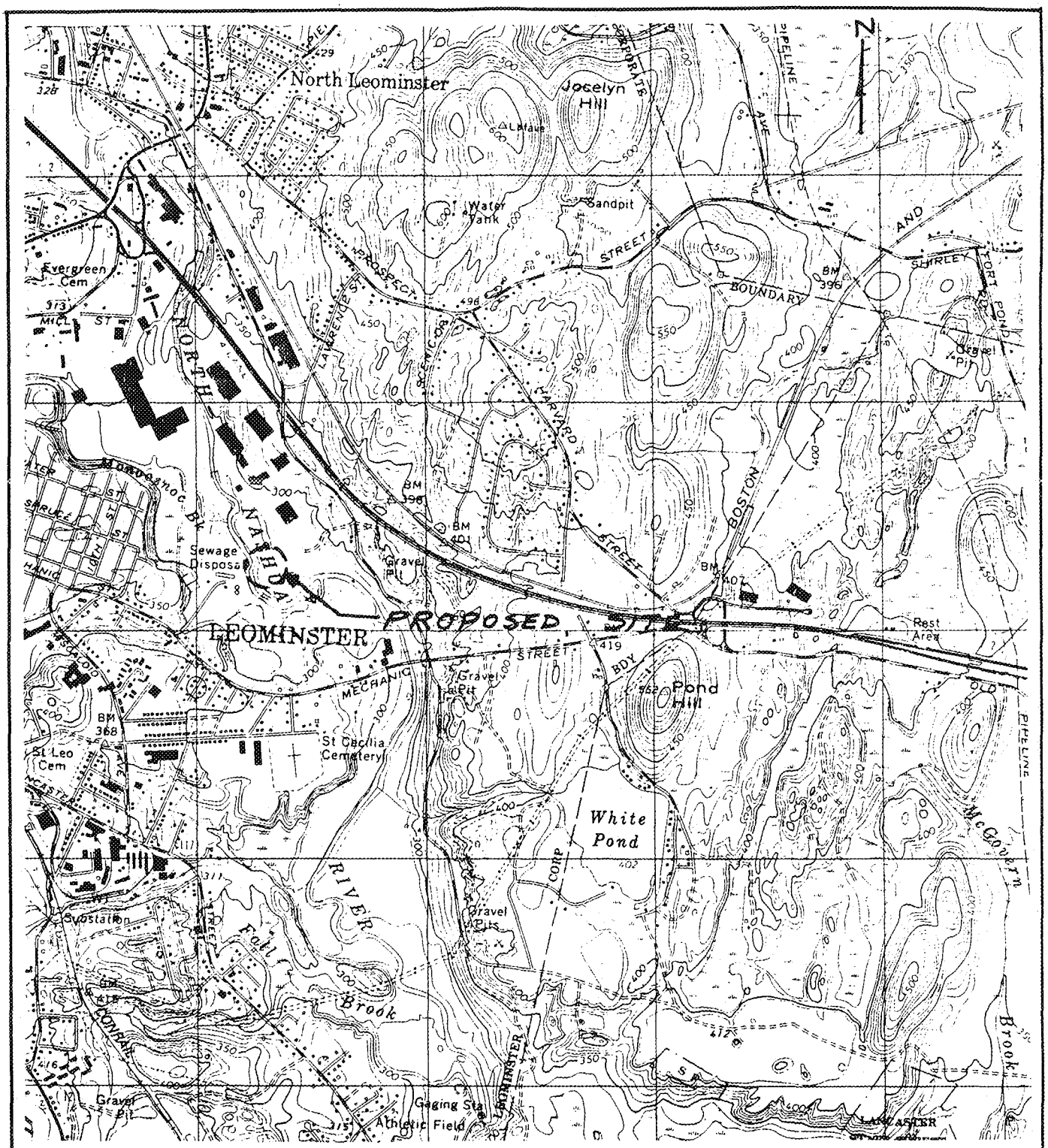
N

PLAN

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

PS DES. BY	SECTION 14 INVESTIGATION
PS DR. BY	PLAN
CK. BY	LEOMINSTER, MASSACHUSETTS

GEOTECH. ENG. BR. SCALE: 1"=40'
CK. NO. Updated



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

PS DES. BY	SECTION 14 INVESTIGATION
PS DR. BY	LOCUS PLAN
CK. BY	LEOMINSTER, MASSACHUSETTS
GEOTECH. ENG. BR.	SCALE: 1:25000
SK. NO. 1	DATE: 3 JAN 1972

Appendix 1

Correspondence